The EDISON ELECTRIC INSTITUTE BULLETIN

February 1957

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Electricity's Place in Nation's Economy
Donald S. Kennedy

Statement on Development of Nuclear Power
Elmer L. Lindseth

Opportunities of Youth in Expanding Universe
Walker L. Cisler

Systems Planning for Computer Applications
Howard S. Levin

ELECTRICAL RESEARCH STATISTICS
THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

(Includes Investor-Owned Companies, Cooperatives, and Government-Owned Utilities)

November, 1955-1956

SOURCE AND DISPOSAL OF ENERGY—MONTH OF NOVEMBER

	1956	1955	%
NET GENERATION* (Kwhrs in Thousands)			
By Fuel Burning Plants	41,340,405	38,545,202	+ 7.3
By Water Power Plants	9,305,085	9,239,348	+ 0.7
Total Generation	**50,645,490**	**47,784,550**	**+ 6.0**
Add—Net Imports Over International Boundaries	333,615	339,003	− 1.6
Less—Company Use	133,831	132,656	+ 0.9
Less—Energy Used by Producer	1,106,818	1,150,915	− 3.8
Net Energy for Distribution	**49,738,456**	**46,839,982**	**+ 6.2**
Lost and Unaccounted for	5,246,379	5,088,974	+ 3.1
Sales to Ultimate Customers	**44,492,077**	**41,751,008**	**+ 6.6**

CLASSIFICATION OF SALES

NUMBER OF CUSTOMERS—As of November 30th			
Residential or Domestic	45,623,409	44,302,368	+ 3.0
Rural (Distinct Rural Rates)	1,688,938	1,651,260	+ 2.3
Commercial or Industrial:			
Small Light and Power	6,129,824	6,046,636	+ 1.4
Large Light and Power	296,049	288,987	+ 2.4
Other Customers	176,430	170,581	+ 3.4
Total Ultimate Customers	**53,914,650**	**52,459,832**	**+ 2.8**
KILOWATTHOUR SALES—During Month of November (Kwhrs in Thousands)			
Residential or Domestic	11,046,758	10,073,138	+ 9.7
Rural (Distinct Rural Rates)	768,482	770,207	− 0.2
Commercial or Industrial:			
Small Light and Power	7,275,805	6,738,208	+ 8.0
Large Light and Power	23,593,913	22,426,964	+ 5.2
Street and Highway Lighting	454,350	422,286	+ 7.6
Other Public Authorities	943,408	882,912	+ 6.9
Railways and Railroads:			
Street and Interurban Railways	198,775	218,257	− 8.9
Electrified Railroads	163,855	172,383	− 5.0
Interdepartmental	46,731	46,653	+ 0.2
Total to Ultimate Customers	**44,492,077**	**41,751,008**	**+ 6.6**
Revenue from Ultimate Customers (Thousands)	**$730,244**	**$681,750**	**+ 7.1**

RESIDENTIAL OR DOMESTIC SERVICE

AVERAGE CUSTOMER DATA—For 12 Months Ended November 30, 1956			
Kilowatthours per Customer	2,956	2,728	+ 8.4
Average Annual Bill	$76.86	$72.29	+ 6.3
Revenue per Kilowatthour	2.60¢	2.65¢	− 1.9

* By Courtesy of the Federal Power Commission.

THE EDISON ELECTRIC INSTITUTE BULLETIN is published monthly by the Edison Electric Institute, an association of electric light and power companies in the United States and its territorial possessions. Its affiliate members consist of members of the Canadian Electrical Association.

The objectives of the Edison Electric Institute are:

The advancement in the public service of the art of producing, transmitting, and distributing electricity and the promotion of scientific research in such field.

The ascertainment and making available to the members and the public of factual information, data, and statistics relating to the electric industry.

To aid its operating company members to generate and sell electric energy at the lowest possible price commensurate with safe and adequate service, giving due regard to the interests of consumer, investor, and employee.

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CONVENTIONS AND MEETINGS

1957

MARCH

4- 5 PEA General and Customers' Accounting Committee, Trexler Hotel, Allentown, Pa.

7 EEI Financing and Investor Relations Committee, Hotel Biltmore, New York, N. Y.

7 PIP Inter-Regional Committee, President Hotel, Kansas City, Mo.

7- 8 2nd Street Tree and Utility Conference, Hotel Cleveland, Ohio

14 PIP Steering Committee, New York City

18-20 Northwest Electric Light and Power Association Business Development Section, Empress Hotel, Victoria, B. C.

21 EEI Industrial Relations Committee, Headquarters, New York, N. Y.

21-22 Pacific Coast Electrical Association Engineering and Operating Section, Hotel Statler, Los Angeles, Calif.

28-29 Oklahoma Utilities Association Annual Convention, Tulsa, Okla.

APRIL

1 EEI Industrial Power and Heating Committee, Edgewater Beach Hotel, Chicago, Ill.

1- 3 Southeastern Electric Exchange 24th Annual Conference, Boca Raton Hotel and Club, Boca Raton, Fla.

1- 4 EEI Sales Conference, Edgewater Beach Hotel, Chicago, Ill.

3- 4 17th Annual Young Men's Utility Conference, Terre Haute House, Terre Haute, Ind.

3- 5 Missouri Valley Electric Association Engineering Conference, Hotel President and Municipal Auditorium, Kansas City, Mo.

8 EEI Accounting Division Advisory and Executive Committees Nominating Committee, Madison Suite, Sheraton-Park Hotel, Washington, D. C.

8-10 EEI-AGA 1957 National Accounting Conference of Electric & Gas Utility Accountants, Sheraton Park and Shoreham Hotels, Washington, D. C.

8-11 EEI Transportation Committee, Texas State Hotel, Houston, Texas

18-19 EEI Industrial Relations Committee jointly with Personnel Sections of Indiana Electric Association and Ohio Electric Utility Institute, and Personnel Practices Committee of Pennsylvania Electric Association, Netherland Plaza Hotel, Cincinnati, Ohio

21-23 Rocky Mountain Electrical League Annual Spring Conference, Shirley Savoy Hotel, Denver, Colo.

24-25 Pacific Coast Electrical Association Administrative Services Section, Hotel La Playa, Carmel, Calif.

24-26 EEI Meter & Service Committee, Soreno Hotel, St. Petersburg, Fla.

24-26 Northwest Electric Light & Power Association Engineering & Operation Section, Sun Valley, Idaho.

28 EEI Purchasing and Store Executive Committee, Penn Sheraton Hotel, Pittsburgh, Pa.

29-30 EEI Insurance Committee, Williamsburg Inn, Williamsburg, Va.

29-May 1 EEI Purchasing and Stores Committee 10th Annual Meeting, Penn Sheraton Hotel, Pittsburgh, Pa.

29-May 1 EEI Accident Prevention Committee, Algiers Hotel, Miami Beach, Fla.

1957

MAY

2- 3 EEI Transmission and Distribution Committee, Muehlebach Hotel, Kansas City, Mo.

5- 9 American Ceramic Society Annual Meeting, Statler Hilton Hotel, Dallas, Tex.

6- 8 EEI Prime Movers Committee, Tides Hotel, St. Petersburg, Fla.

9-10 PEA Electrical Equipment Committee, Spring Meeting, Hotel Roosevelt, Pittsburgh, Pa.

15-17 Pacific Coast Electrical Association Annual Convention, Fairmount Hotel, San Francisco, Calif.

16 EEI Industrial Relations Committee, Headquarters, New York City

20-21 EEI Electrical System and Equipment Committee, Statler Hotel, Buffalo, N. Y.

23 EEI-AGA Accounting Division Time and Place Committee, AGA Headquarters, New York, N. Y.

24 EEI-AGA Accounting Division Orientation Meeting, EEI Headquarters, New York, N. Y.

31-June 1 EEI Financing and Investor Relations Committee, Edgewater Beach Hotel, Chicago, Ill.

JUNE

3- 5 EEI Annual Convention, Chicago, Ill.

14 Public Utilities Association of the Virginias Accident Prevention Conference, Daniel Boone Hotel, Charleston, W. Va.

19-21 CEA Annual Convention, Murray Bay, Quebec

23-25 Wisconsin Utilities Association Annual Convention, Accounting Section, King's Gateway Hotel, Land o' Lakes, Wisc.

23-26 Michigan Electric Association, Grand Hotel, Mackinac Island, Mich.

SEPTEMBER

9-13 Illuminating Engineering Society National Technical Conference, Biltmore Hotel, Atlanta, Ga.

19-20 EEI-AGA Organization Meeting, Leamington Hotel, Minneapolis, Minn.

20-21 39th Annual Meeting, Public Utilities Association of the Virginias, Green-Brier Hotel, White Sulphur Springs, W. Va.

23-25 EEI Industrial Relations 10th Round Table Conference, Drake Hotel, Chicago, Ill.

24-26 EEI Meter & Service Committee, Hotel Nicolett, Minneapolis, Minn.

25-27 PIP 1957 Workshop Conference, Whittier Hotel, Detroit, Mich.

30-Oct. 1 EEI Electrical Systems and Equipment Committee, Cosmopolitan Hotel, Denver, Colo.

OCTOBER

2- 4 Indiana Electric Association, French Lick-Sheraton Hotel, French Lick, Ind.

17-18 EEI Transmission and Distribution Committee, Statler Hotel, Boston, Mass.

28-31 NARUC Annual Convention, Peabody Hotel, Memphis, Tenn.

NOVEMBER

7- 8 Pacific Coast Electrical Association Hawaiian Conference, Reef Hotel, Honolulu, Hawaii

The EDISON ELECTRIC INSTITUTE
BULLETIN

Electricity's Place in the Nation's Economy

By Donald S. Kennedy
President, Edison Electric Institute and President, Oklahoma Gas and Electric Co.

An address before the New York Society of Security Analysts, Jan. 30, 1957

IT is hard to imagine a group of people better informed on the electric light and power industry than those of you whose work is the day-to-day scrutiny and evaluation of the financing and other operations of individual electric power companies—what they have done, what they are doing, and what their potentialities are.

Most of the members of the electric light and power industry who have appeared before you have discussed the affairs of their own companies, and however much I would enjoy doing likewise, I am going to limit my observations to the industry as a whole.

Because it is an important adjunct to the operations and progress of individual electric companies, and to the advancement of the industry as a whole, let me begin with a little discussion of the Edison Electric Institute, even though many of you may be generally familiar with some of its work.

The Institute's membership includes nearly 200 electric utility operating companies which provide electricity for approximately 95 per cent of all customers served in the United States by the investor-owned electric companies. The Institute's work has been vital to the continuing development of the industry. Its purpose and objectives were set forth at its founding in 1933. These are worth reviewing: (1) The advancement in the public service of the art of producing, transmitting and distributing electricity and the promotion of scientific research in such field; (2) The ascertainment and making available to the members and the public of factual information, data and statistics relating to the electric industry; and (3) To aid its operating company members to generate and sell electric energy at the lowest possible price commensurate with safe and adequate service, giving due regard to the interests of consumer, investor and employee.

The policies and direction of activities of the Institute are the responsibility of the 45 members of the Board of Directors, one-third of whom is elected each year for a three-year term, thereby enabling diversified industry-wide representation.

1700 on Committees

Some 1700 electric utility leaders are currently serving on the 60 standing committees of the Institute. Grouped in four main divisions, Accounting, Commercial, Engineering and General, these committees embrace the principal fields of electric utility operations.

The innumerable studies and reports of the committees, the free discussion in their meetings, and the long hours of work put in by their members, have been of greatest importance to the ever-increasing efficiency of the production and distribution of electricity, higher standards of service, and improved practices and equipment.

In addition to the work of the standing committees, much of which involves extensive research, there are many basic scientific research projects on which Institute groups work or to which it contributes financial support. Perhaps one of the more important and potentially useful research activities of the Institute is that being conducted by its Technical Appraisal Task Force on Nuclear Energy, which has as its primary objective the acceleration of economic nuclear power development in the United States.

The Institute also has many representatives on inter-industry committees and on joint committees with other national oganizations to deal with important matters of mutual concern to the electric industry and other national industries and groups. These joint committees are predominantly technical, with their principal interest in standardization, an important factor in economic operation. Another example of inter-industry activity is sales promotion, in which field the work of the Institute has received wide commendation and support.

As I have indicated, the information structure of the Institute is based solidly upon its committee activities. Its information mechanisms include the free interchange of views at the several hundred committee, division and other meetings held each year, as well as the publication and distribution of a large number of committee studies, reports, reference and handbooks. Several periodicals of interest to the industry are published in addition to informational booklets and other material of value both to the industry and to the public.

Its comprehensive statistical service is widely used by the industry itself, allied industries, financial institutions, news agencies and governmental bodies. Occasional press re-

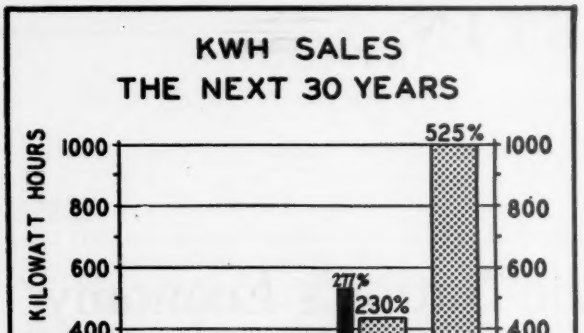

Fig. 1

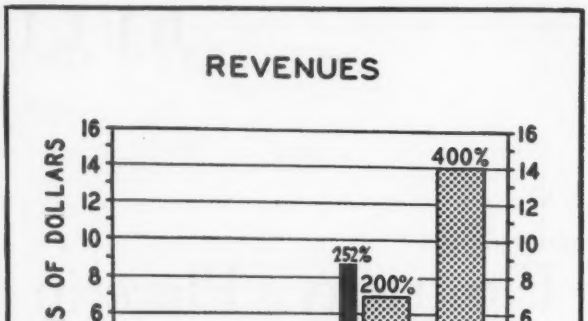

Fig. 2

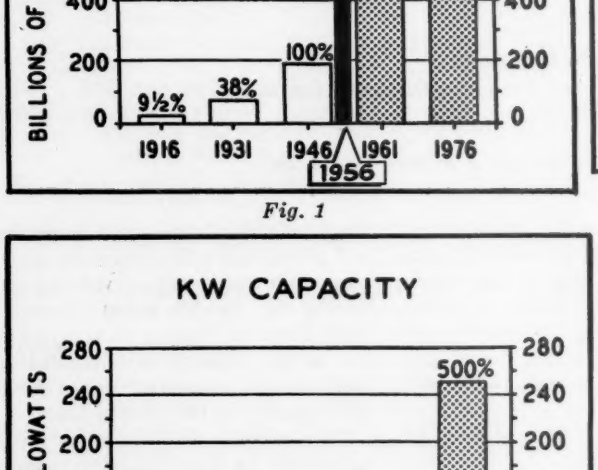

Fig. 3

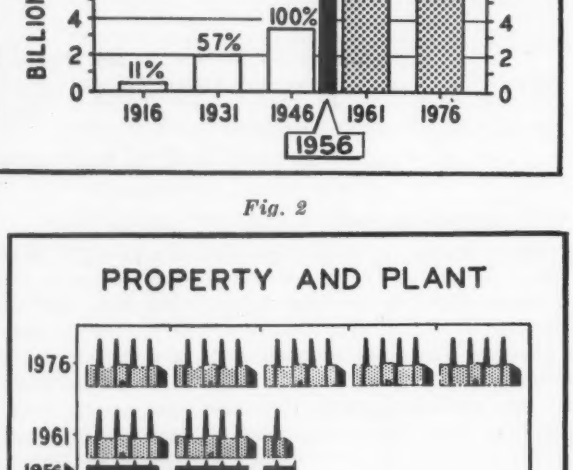

Fig. 4

leases are issued by the Institute to supply information of current news value. Because the Institute is widely recognized as a source of accurate and comprehensive data on the electric industry, a continuing flow of inquiries from all parts of the country is received.

The progress and good reputation of individual companies are reflected in the progress and reputation of the whole industry. There are no trade secrets in the electric light and power industry. It shares its information freely. Working through the committees of the Institute it initiates far-reaching developments and shares experiences and techniques of great economic and human value that add up to the ultimate benefit of consumer, investor and employee.

Conservatism in not going overboard verbally is so traditional with us that it has resulted nearly always in modest statements by the industry as concerned with long-term growth potentials of the industry.

I think you may be interested in two or three striking examples which are pertinent to our discussion today. But first I want to make clear the distinction between prudence in planning and installing generating and distribution facilities in ample time for all potential requirements, and prudence in not going overboard on long-shot possibilities.

Prudence in planning and installations for all needs has been clearly demonstrated from the very beginning of the electric industry. It has had a remarkable, possibly unique, record in anticipating and satisfying the nation's industrial and business, domestic and military needs for electricity. In respect to the military angle, we treasure these three comments and I quote first, "Electricity has never been too little, nor too late," second, "Well Done," and lastly, "Emergency demands, great in volume and complexity, were met fully and promptly by the American utility industry. . . . We were fortunate indeed to have such magnificent support."

The first quotation was from a statement by a former Director of the War Production Board, the second by C. W. Nimitz, Fleet Admiral of the U. S. Navy in the Second World War, and the third from a former Chief of Staff of the War Department, Dwight D. Eisenhower.

With respect to prudence in forecasting, let us take the first example. At the Edison Electric Institute Convention in 1947, two years after the end of World War II, and during a period when economic forecasts and calculations in general were as apt to be pessimistic as otherwise, the announcement that the electric power industry would expend $4 billion in a huge construction program over the next four years came as important financial news and produced many a serious discussion as to how this then gigantic program could be financed.

This construction program, which started in 1947, extended well beyond the four years and is still going strong. With the end of the first ten years, the $4 billion had grown to nearly $24 billion expended by the investor-owned companies on new construction in the 1947-1956 decade. In the financing of this gigantic program, your interest and help have been indispensable.

At our 1947 Convention, an unusual and provocative speech was made by Elmer L. Lindseth, President of The Cleveland Electric Illuminating Co., who a little later served a term as President of the EEI. The provocative part of the speech was a well-documented and soundly-reasoned discussion of the merits of better compensation for electric utility company executives. The unusual part was a dramatization of the 30-year possible growth of the industry, based on one-half of the rate of growth of the preceding thirty years.

Mr. Lindseth emphasized that since long-range forecasting is both difficult and inexact, he was not forecasting but was merely projecting on the arbitrary premise of a rate of growth from 1946 to 1976, equal to one-half that from 1916 to 1946. "Note this premise carefully," he warned. "It is arbitrary. It may be unimaginative. But the results are astounding." They were astounding then. What actually has happened in the ensuing ten years is even more astonishing.

Mr. Lindseth's calculations showed that U. S. annual sales of electricity increased 10½ times from 1916 to 1946. His arbitrary projection of sales, taking 1946 as 100 per cent, was a 130 per cent increase to be reached in 1961, fifteen years later, and a 425 per cent increase in 1976. The actual ten-year increase attained in 1956 was 177 per cent. Figure 1 is a reproduction of Mr. Lindseth's sales chart with the 1956 figures superimposed.

On gross revenues from electric power the arbitrary projection from 1946 showed a 100 per cent increase to be reached in 1961, and a 300 per cent increase in 1976. The actual increase attained in 1956, only ten years since 1946, was 152 per cent. (Figure 2). On generating capacity, Mr. Lindseth's projection from 1946 designated a 125 per cent increase to be reached in 1961, and a 400 per cent increase in 1976. The actual increase attained was 139 per cent in 1956. (Figure 3).

Investment Projections

Total investment in property and plant was projected from 1946 to reach an increase of about 125 per cent in 1961, and a 400 per cent increase in 1976. The increase attained in 1956 was 142 per cent. (Figure 4).

In a period of inflation, when costs of many items were greatly increased over the years preceding 1946, the 1956 relationship of property and plant investment to generating capacity is remarkable. Technological advances in plant design and the installation of larger generating units were prime factors in this achievement. Among other things efficient selection and operation of production, transmission and distribution facilities are indicated in the favorable percentage-wise gains in both sales and gross revenues, in comparison with generating capacity increases.

Let us take a quick look at what has happened between the beginning of 1947 and the end of 1956. Production of electricity by the industry increased from 223 *billion* kwhr to 601 *billion;* generating capability from 50 *million* kw to 126 *million* kw; sales from 191 *billion* kwhr to 529 *billion;* annual per capita production of electric power from 1912 kwhr to 4056 kwhr, while population increased from 141 million people to 169 million. Customers grew also from 36 million to 54 million and annual use per domestic customer increased from 1329 kwhr to approximately 2965 kwhr. (Just about today (Jan. 30), the annual use per domestic customer should reach 3000 kwhr.)

While the foregoing figures testify to the extraordinary growth of the electric industry in the past decade, the several growth categories are in comparison with themselves—that is, kilowatthour production is compared with kilowatthour production, and so on. How does its growth compare with that of the whole national economy?

As one measure of its relative position, let us compare the growth of the electric industry's production in kwhr with that of the GNP.

Figure 5 shows that Gross National Product increased 153 per cent in the 1936-1946 decade, and kilowatthour production 104 per cent. When we make the comparison for the 1946-1956 decade the electric industry's dynamic growth and its constantly expanding integration into the whole fabric of American life are apparent.

In this period, note how the pattern of the blocks has been reversed. Gross National Product increased 97 per cent, while kilowatthour production increased 170 per cent.

This trend is further demonstrated

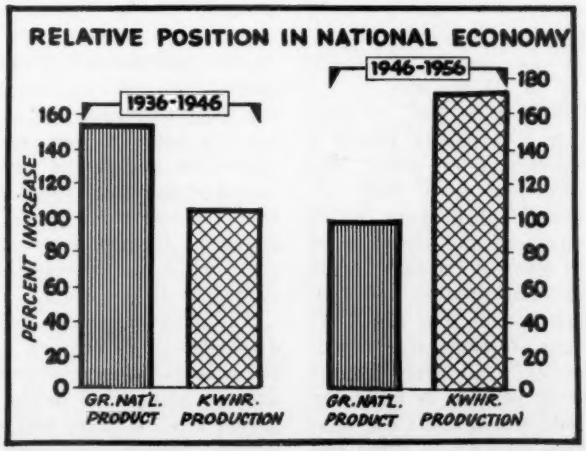

Fig. 5

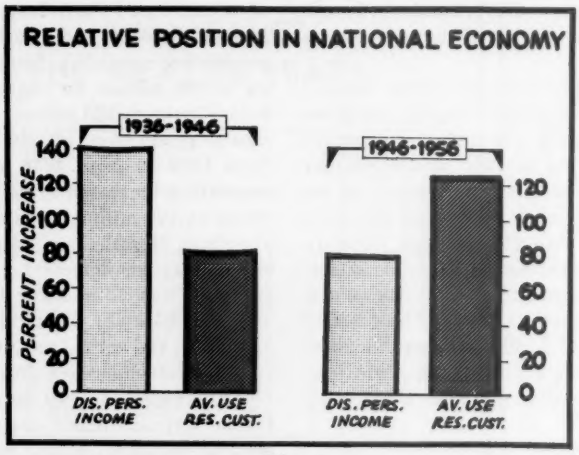

Fig. 6

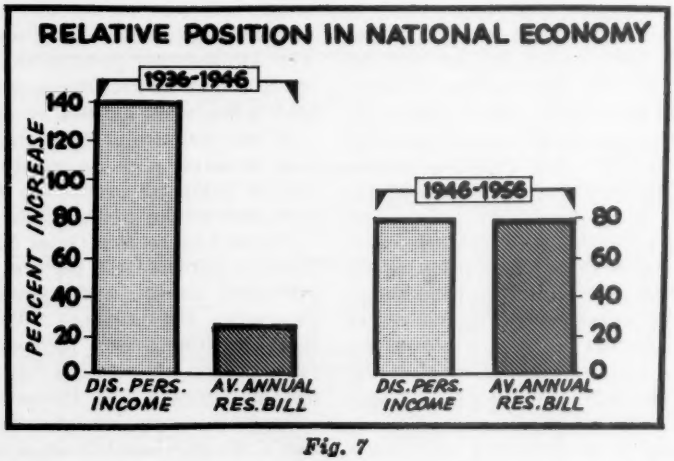

Fig. 7

in the next chart (Figure 6). Here we compare Disposable Personal Income with average annual use per residential customer. In the 1936-1946 period, Disposable Personal Income increased 140 per cent, and average residential use 81 per cent. In the 1946-1956 period the relative increase is 80 per cent for Disposable Personal Income, while the block denoting increase in average annual residential use moves up to 123 per cent.

In the 1936-1946 decade, we were successively in a depression period, a period of recovery, a war period, and a minor recession, with their attendant economic phenomena, which brought pronounced and often abrupt reflections in many of the components of Gross National Product and Disposal Personal Income. The 1946-1956 period was one of remarkable expansion in practically all fields. While different basing periods, or longer or shorter periods, would affect the relative percentage increase of these two charts, it is doubtful that they would alter significantly the patterns of the blocks or fail to show the trend of the electric industry in its outpacing of the economy as a whole.

One more chart (7), developed from the grouping of the past two decades, may be of interest. Here I have compared the percentage increase of Disposable Personal Income with that of the average annual bill for electricity to the residential customer. In the period from 1936 to 1946 the increase for the former was 140 per cent, and for the latter 25 per cent. For the 1946-1956 period the percentage of increase was nearly equal, although over the last three years Disposable Personal Income increased 14 per cent, while the average annual bill gained by 19 per cent.

The principal reason for the great disparity in percentage growth between Disposable Personal Income and average annual bill in the 1936-1946 period was the sharp and abrupt rise in the former beginning in 1939, while the scarcity of consumer goods, particularly electrical appliances during the war, reacted against the increase in average annual bills.

The tremendous progress which the electric industry has experienced would not have been possible without conscientious and consistent sales promotion by the industry. In addition to hundreds of promotional programs being executed on the local level, there are several industry-wide programs which I would like to mention briefly.

One such program is HOUSEPOWER, which has as its major objective the promotion of adequate wiring in the 78 per cent of America's 46 million homes which do not have it now. Another, the "Live Better . . . Electrically" program, is aimed at increasing the use of electrical appliances in the home. Both of these have the active support of hundreds of ultilities and manufacturers. Another program of long-standing is that being carried on by the Better Light-Better Sight Bureau for the purpose of increasing public understanding of the need for proper lighting. Still other programs stimulate increasing utilization of electricity in business and industry. Such programs contribute greatly to the industry's continuing growth.

Another of the forward-looking activities in which the electric industry is engaged is that of local area development. The economic health of the local electric company is uniquely linked with that of the area it serves, since all of its customers are in its service area, and almost everyone is a customer.

Probably the most important overall benefit of area development is that a successful program broadens the economic base of the entire area. One estimate is that for every 1000 jobs created in industry there are added: 1150 jobs in other service and supporting industries, a market for 700 dwelling units, a market for the output of 250 farm workers, customers enough to support 40 new retail merchants, and increased state tax revenue of more than $100,000.

Among some of the rewards to communities which have undertaken area development projects have been new industries, new payrolls, new ratables, better zoning, better balance between agricultural and industrial employment, and improved agricultural practices.

Increasingly the electric industry

shares in, contributes to, and is vital to nearly every industrial, business, agricultural and domestic endeavor in our modern economic and social structure. Among the important factors contributing to its amazing growth in the postwar years are the widening applications and new uses for electricity in industry, and the widespread advances in all industrial fronts. This includes the emergence or rapid development of entirely new industries, processes and products, whose conception and existence are based on an abundant supply of electric power—for example, the electronics industry, atomic energy, television, the advances in automation of industry, light metals and chemical production.

The factors and influences that have contributed to the growth of the electric industry during the past decade are expected to continue over the decade just beginning, and beyond. Population alone is expected to reach about 200 million by the end of the decade, and over 230 million, twenty years from now.

Standards Seen Increasing

Economists, who are not often of the same mind, agree that given the avoidance of nuclear war and an attitude by labor that it should not expect a greater share of the national income than is warranted by increased productivity, there will continue to be a further increase in the standard of living. Higher standards of living, after all, have been and will continue to be the prime motivation in all the material advances, not only of this country, but of the world.

In all fields, multiplying research for better methods and better manpower utilization cannot fail to bring unusually large increases in the use of electric power with its great assets of mobility, adaptability, and availability.

Moving toward 1966 the electric industry, including municipals, co-ops, state power districts and federal agencies, entered the year 1957 with a very sizeable backlog of new generating capability already scheduled for addition to the power lines. This totaled as of January 1st some 45 million kw, with over 35 million of this due for installation in 1957 through 1959.

This figure of 45 million kw in new generating capability already in sight at the beginning of the 1957-1966 decade is more than one-third of the present total installation and it is approximately four times as great as the backlog of some 11 million kw of scheduled installations at the beginning of the 1947-56 decade.

In the 1956 EEI year-end review of the electric light and power industry we estimated that the present net generating capability of 126.5 million kw would increase by more than 110 million kw by the end of 1966. It would not, I think, be unreasonable to move our sights up and increase today the year-end estimate to double that of the present installations by the end of 1966. This would give slightly more than 250 million kw of generating capability by that time, or approximately the total shown for 1976 in Mr. Lindseth's projection mentioned before.

On the basis of 250 million kw of capability, a projection based on our present experience would show that by the end of 1966 the industry should reach a total annual production of 1.250 trillion kwhr, sales of 1.1 trillion, and a gross revenue of $17.5 billion. I think the potentialities for exceeding these figures are implicit from our past history, and the expected continuing expansion of the national economy.

Less than a year ago, what seemed a reasonable estimate for construction expenditures over the coming 10-year period was an average of over $3 billion a year by the investor-owned companies. Very recently the estimates have been raised to an expectation of an average of over $4 billion a year for the 1957-1966 period, ranging upward from the current rate of expenditure, nearly $3 billion a year, to about $5 billion by the end of 1966.

Price of Construction

Construction expenditures by the investor-owned companies have averaged about $2.34 billion through 1947-1956, starting the first year of the decade with $1.23 billion and ending it with $2.9 billion.

During the past 10-year period new capital provided approximately 63 per cent of the total construction expenditures, and the remaining 37 per cent came from internal sources. Of the new capital 66 per cent represented long-term debt, 21 per cent common stock and 13 per cent preferred. The percentages, of course, fluctuated from year to year, as they will in coming years.

There is a curious paradox in the fact that measures taken to tighten the cost and flow of money as a curb on inflation produce an adverse effect on costs, and particularly so in a regulated industry such as the investor-owned electric utilities where plant investment is very high in relation to sales turnover. From this standpoint, the rise in the cost of money over the past twelve months or so must be philosophically accepted, as we have had to accept the increases in the cost of the other components of our operating expenses, materials for plant construction, equipment, fuel, labor, taxes and so on, and endeavor to offset it as we have offset rises in the other components.

In the long-range overall picture, I cannot see any appreciable effect of the higher cost of capital on the industry's expansion plans.

Inflation Problem Met

In a period of inflated costs that brought and solved many and varied problems, the electric industry maintained a favorable relationship between investment, productive capacity, sales and revenue and kept earnings at a height that attracted investors in a highly sensitive market.

This has been accomplished largely through the continuing search for better and more economical operational methods, more economical and functional design of new plants and other structures, and in many other ways.

Much time, effort and research have gone into the discovery and development of methods for offsetting the rising costs of taxes, labor, equipment and construction materials. One of the most substantial savings has resulted from the increasing efficiency of fuel utilization. Contributing to this is the use of continually rising steam pressures which are now reaching up into the super-critical range. In 1946 it required an average of 1.29 pounds of coal to produce one kilowatthour. In 1956, only .93 pounds was required per kilowatthour—a reduction of 28 per cent. Some of the newest plants require less than three-quarters of a pound. Similar economies have been effected in the use of gas and other fuels. Last year alone, the savings from increased fuel efficiency amounted to $44 million.

The ever-larger size of new genera-

tors has also produced operating economies, as the larger units generate power at a lower cost per kilowatthour. In addition, new installations have permitted the closing down of stations which required more manpower to operate and which had a lower thermal efficiency.

Automation, too, is playing an important part in combating inflation. The electric industry is one of the most mechanized of all industries. Long before the word "automation" came into popular usage, our industry was pioneering the development of automatic controls to replace manual operations, and the search for new applications of electronic controls continues today.

The transmission of electricity at higher voltages has been another means of reducing operating costs. Some lines are operating at voltages as high as 345,000 volts, and transmission at 220,000 volts has become common practice.

Many companies have realized savings through the interconnection and pooling of facilities with other companies. A number of such power pools have been in operation for many years. These interconnections and pools enable the utilization of lowest cost generating equipment, interchange of reserve, diversity of load, and the location of new facilities for maximum permanent usefulness, all resulting in lower overall costs.

In many other operations such as the clearing and maintaining of rights-of-way, extending the life of wood poles, and reduction of street lighting circuit maintenance costs, new techniques offset inflation. Even fly-ash, once a liability, has been converted into a commercially marketable by-product of electric generation.

Communications Practices

The use of two-way radio communications has resulted in a tremendous saving in time for both men and equipment. Microwave communication systems have been used for the remote control of substations, for automatic relaying of load information, and to provide a greater reliability in protective relay schemes which guard against service interruptions.

Aside from the humane aspect, accident prevention programs, too, have tended to counter inflationary costs. The electric industry reduced the frequency rate of accidents, which is the number of reportable injuries per million man-hours, appreciably over the past decade. In 1946 the rate was 14.81 and in 1955 it was 7.62; so in ten years we about cut it in half, an accomplishment in which we all take much pride.

These are just some of the ways in which the industry has "tightened its belt" to compensate for inflation.

There is perhaps no area of the electric industry which commands more attention today than the development of atomic power. As you know, the original Atomic Energy Act in 1946 established a virtual government monopoly on all atomic development. With passage of the Atomic Energy Act of 1954, American industry was for the first time permitted to develop and construct its own atomic power plants. Marked progress has been made in this field by the electric companies in this relatively short period of time.

Atomic Power Projects

By the end of 1956, 49 electric power companies and associated service organizations were taking part in projects for the development and construction of 11 atomic power plants. An additional 72 companies were studying atomic power as members of various study groups or individually under the AEC access permit program.

Of the 11 atomic power plants already announced, six are scheduled to be in operation by 1960, and the remaining five plants after that time. With an ultimate capability of over 1.3 million kw, the 11 plants will require an estimated expenditure by the power companies of over $350 million.

Construction of 9 of the 11 plants is to be accomplished entirely with investor funds, although the AEC will assist with research and development costs on at least two of this group. The other two plants are being built primarily by the AEC as part of its five-year reactor development program, with participation by electric power companies in the plant development and construction.

The real importance of atomic energy to power is the assurance it gives that the United States will have ample fuel to meet its future requirements for electricity. Although supplies of these conventional fuels in this country are adequate to meet demands for decades to come, they are not inexhaustible. This new kind of fuel can be used to save our coal, oil and gas for other important uses. In addition, there is considerable promise that heat from atomic fuels will cost less than conventional fuels.

I would like to digress for a moment to comment on atomic power development in other countries. Many news items have been published concerning development in other nations which, at first glance, may lead some to believe that other countries have progressed further than we have in this country. It must be remembered that the economic practicality of atomic power plants versus conventional plants will vary from area to area . . . even within this nation. The availability of a conventional fuel and its cost including transportation to generating stations, and the degree of urgency for the need for increased kilowatthour generation are important factors.

At the Calder Hall atomic plant in Great Britain, for example, which was built principally for the purpose of producing plutonium for weapons and only secondarily provides power generation as a by-product, the need for a new fuel source and for increased electricity supply contributed greatly to the feasibility of the plant. In this country the situation is very different, and our present course of continued research and further experimentation to advance the technology is the more practical approach.

Research on Atom

The fact that any nation is presently producing more kilowatthours by atomic power than the United States, would in itself be no basis for concluding that that nation has advanced further in technical development of atomic power than we have in this country. Atomic power research and development are an important part of the daily work of electric companies, commanding a substantial amount of the manpower and financial resources of the industry. We are building various types of plants which will give us a tremendous wealth of data and experience on atomic power.

* * * * *

The electric industry's astounding growth in plant, the development and application of important new con-

(*Continued on page* 64)

Statement on Nuclear Power Development

Lindseth Reports for EEI on Substantial Progress and Significant Expansion

SIXTY-NINE electric companies in 31 states and the District of Columbia are participating in one or more of 14 atomic reactor power projects which will add over 1,500,000 kilowatts of capacity to the nation's power supply.

This statement was made by Elmer L. Lindseth, Vice Chairman of the Edison Electric Institute Committee on Atomic Power, to the Joint Congressional Committee on Atomic Energy. Mr. Lindseth, who also is president of The Cleveland Electric Illuminating Co., said that these 14 projects will involve more than $400 million of investor funds.

Seven projects are either under construction or in the immediate preconstruction phase, and seven are in various stages of planning, Mr. Lindseth said, in making the industry's annual progress report on development, state and growth of atomic energy for electric power. He continued: "The past year was one of continued progress and significant expansion of our industry's program of nuclear power development. Present plans of electric power companies, both in construction of nuclear power plants and in study of advanced reactor concepts, comprise a comprehensive program."

Since May, 1956, at which time plans for nine nuclear power plants had already been announced, five additional companies or groups of companies have made known plans for nuclear reactor projects and a sixth has informed the AEC that investigations are underway to determine the feasibility of constructing a power reactor in its service area.

The five additional companies or groups of companies are: Carolinas-Virginia Nuclear Power Associates, Inc.; the New England Electric System; a group of electric power companies in Minnesota, Wisconsin, Missouri, North and South Dakota and Iowa; a group consisting of 12 Ohio Valley Utility companies; and Pacific Gas & Electric Co. Middle South Utilities, Inc., is making investigations as to feasibility of constructing a power reactor in its service area.

Mr. Lindreth's statement before the Joint Committee follows:

My name is Elmer L. Lindseth. I am president of the Cleveland Electric Illuminating Co., vice chairman of the Edison Electric Institute Committee on Atomic Power and a past president of the Institute.

I am appearing today on behalf of the Institute in response to the invitation of the Joint Committee. Chairman Durham's invitation for a representative of the Institute to present its views at these hearings on the development, state, and growth of the atomic energy industry is greatly appreciated in view of the vital interest which the Institute as a body, and its member companies who serve 75 per cent of the nation's electric users, have in these matters.

This statement has been authorized by the Edison Electric Institute Committee on Atomic Power which comprises 14 member company executives. The names and business affiliations of the committee members are appended to this statement.

U. S. Leads World

The unique genius of the American economy under free enterprise has given the United States undisputed world leadership in electric power production over many decades, utilizing every available energy source. Electric utility companies have a long record of reducing the cost of their service to the public through development of new methods and processes and improved efficiency of operation. The industry today employs every available means in order to continue this long-term trend for the benefit of our customers. To this end we believe that development of nuclear power is a logical extension of our continuing endeavor to provide electricity in abundance at the lowest possible price. The present program of nuclear development, involving expenditure of hundreds of millions of dollars, exemplifies this continuing endeavor.

During the past year substantial progress has been made in the development of nuclear power. Since the Joint Committee is to receive statements from representatives of most of our industry groups or companies sponsoring projects for the development of nuclear plants, we shall not in this statement attempt to go into detail on progress made on a particular plant or on specific technical problems but rather will limit our comments to the overall industry picture.

At the time of our Committee's last presentation before the Joint Committee in May of 1956, forty-four electric power companies and associated service organizations had announced plans for development and construction of nine nuclear power plants, ranging in size from 3000 to 236,000 kilowatts of capacity. Their participation was in one of three ways: two projects were going forward under the AEC Five-Year Reactor Development Program, two under the Power Demonstration Reactor Program and five for development on a straight license basis.

Since last May and up to last week three additional companies or groups of companies had announced plans for the development and construction of nuclear power plants.

In October, 1956, Carolinas-Virginia Nuclear Power Associates, Inc., consisting of four utilities in the area, announced its intention to construct a nuclear power plant or plants.

In December, 1956, the New England Electric System, which is also a sponsor of the Yankee Atomic Electric Co. as well as Atomic Power Development Associates, Inc., announced plans to construct a 200,000 kw (electric) nuclear power plant in its service area with completion scheduled in 1964.

Earlier this month a group of util-

NUCLEAR POWER PLANTS

Investor-Owned Electric Utilities Participation
As of Feb. 21, 1957
(Based on Published Information)

EXHIBIT I—PLANTS UNDER CONSTRUCTION OR IN IMMEDIATE PRECONSTRUCTION PHASE

Organization	Type Reactor	Electrical Capacity of Plant	Location	Estimated Cost to Organization	In Operation By
Independent Industrial Program					
1. Consolidated Edison Co. of New York, Inc.	Pressurized Water Thorium-Uranium Converter	236,000	Indian Point, N. Y.	$55,000,000	1960
*2. Commonwealth Edison Co..... Nuclear Power Group, Inc.	Boiling Water	180,000	Grundy County, Ill.	45,000,000	1960
3. Pacific Gas and Electric Co.....	Boiling Water Prototype for Dresden Plant	3,000	Livermore, Calif.	600,000	1957
As Part of AEC Power Demonstration Reactor Program					
*4. Power Reactor Development Co..... The Detroit Edison Co.	Fast Breeder	100,000	Monroe, Mich.	54,000,000	1960
*5. Yankee Atomic Electric Co.....	Pressurized Water Using Steel Clad Uranium Oxide Fuel Elements	134,000	Rowe, Mass.	34,500,000	1960
Participating in Plants Being Constructed Primarily by AEC as Part of Its 5-Year Reactor Development Program					
6. Duquesne Light Co.....	Pressurized Water	60,000	Shippingport, Pa.	15,000,000	1957
7. Southern California Edison Co.....	Sodium Graphite	7,500	Santa Susanna, Calif.	1,000,000	1957

* For companies in group see Exhibit III.

EXHIBIT II—REACTOR PROJECTS IN VARIOUS PLANNING STAGES

Investor-Owned Electric Utilities Participation
As of Feb. 21, 1957
(Based on Published Information)

Organization	Type Reactor	Electrical Capacity of Plant	General Location	Estimated Cost to Organization	In Operation By
*1. Carolinas-Virginia Nuclear Power Associates, Inc.	(1)	(1)	Carolinas or Virginia	(1)	(1)
*2. Florida Nuclear Power Group.....	(1)	200,000	Florida	$50,000,000	1962
*3. Midwest Group.....	Boiling Water	60,000	Northern States Power Co. Service Area	20-25,000,000	1962
4. New England Electric System.....	(1)	200,000	New England	(1)	1964
5. Pennsylvania Power & Light Co.....	Aqueous Homogeneous	150,000	Eastern Pennsylvania	(1)	1962
*6. Ohio Valley Group.....	Advanced	None	(1)	(1)	1962
7. Pacific Gas & Electric Co.....	Pressurized Water or Boiling Water	(1)	California	(1)	(1)

* For companies in group see Exhibit III.
(1) Not yet announced.

ities in Minnesota, Wisconsin, Missouri, North and South Dakota and Iowa announced that it is undertaking a nuclear power plant with electric capacity of 60,000 kw on the system of Northern States Power Co.

This week two other companies or groups of companies have indicated their intention to proceed with reactor projects. An Ohio Valley Group, consisting of 12 companies, announced that it intends to submit a proposal for the comprehensive development of an advanced reactor concept, including the construction of a prototype reactor with a heat output of 50,000 kilowatts. Pacific Gas and Electric Co. announced that it intends, either alone or in partnership with other California investor - owned electric utility companies, to submit a proposal under the AEC third round invitation involving a large scale advance type pressurized water or boiling water reactor electric power plant.

These five undertakings announced in recent months bring to 14 the number of reactor projects in which electric power companies are participating. These projects, in which 69 companies are participating, are expected to have an electric capacity in excess of 1,5000,000 kilowatts and involve expenditures of over 400 million dollars of investor funds.

As shown in Exhibit I, seven of these are either under construction or in the immediate pre-construction phase. As indicated in Exhibit II, seven are in various stages of planning.

In addition, Middle South Utilities, Inc. and its four operating subsidiaries—Arkansas Power and Light Co., Louisiana Power & Light Co., Mississippi Power and Light Co., and New Orleans Public Service Inc.—have informed the AEC that they are

conducting investigations of the feasibility of constructing a nuclear plant in their service area.

In selecting reactors for development and construction the electric power companies or groups of companies continue to be guided by the very basic consideration that development and construction of the reactor selected should make a significant contribution toward the ultimate achievement of commercial utilization of nuclear power. It is the opinion of the individual companies that commercial utilization of nuclear power best can be achieved through development and construction at this time of a number of different reactor types and variations. This is because of the belief that it is not possible to make a determination with any degree of accuracy now as to which reactor type or types ultimately will prove most advantageous for commercial use. Therefore, the present broad program entails the development of a number of different basic reactor types, plus variations and improvements of certain of those types.

At present, large-scale demonstration projects are under construction or in an advanced stage of planning for four of the reactor types that were included in the AEC's original Five-Year Program, namely, the pressurized water reactor, the boiling water reactor, the sodium-graphite reactor and the fast-breeder reactor.

In announcing its third-round Power Demonstration Reactor Program, the AEC stated that progress in the technology of two other types of reactors is such that construction of additional large-scale demonstration projects of those types presently is warranted and desirable. These are the natural-uranium heavy water-moderated reactor and the fluid fuel reactor system. An aqueous homogeneous reactor of the latter type has been the subject of a joint research and development project since July, 1955, by Pennsylvania Power & Light Co. and Westinghouse Electric Corp., and is being studied for a large-scale demonstration.

A natural uranium heavy water-moderated reactor in large size is being studied as to feasibility by the Florida Nuclear Power Group and, a heavy water - moderated reactor which either would use natural-uranium fuel or would be a prototype for a large-scale natural-uranium reactor, among other reactor types, is being studied by Middle South Utilities, Inc.

These developments are mentioned in order to emphasize that power companies are making every effort to respond to the AEC's invitation for nuclear power plant proposals.

Power companies also are cognizant of that part of the AEC's third-round announcement that invites proposals for other types of reactors, including those that represent variations of designs for currently active projects. We feel that our broad goal, namely, that each undertaking make a significant contribution toward achievement of ultimate commercial utilization of nuclear power, can best be met through development and construction both of variations of types already being developed and more advanced reactor types not yet undertaken.

It may be desirable to develop and

Exhibit III—Membership of Groups Participating in Reactor Projects

NUCLEAR POWER GROUP, INC.
- American Gas and Electric Service Corp.
- Commonwealth Edison Co.
- Central Illinois Light Co.
- Illinois Power Co.
- Kansas City Power & Light Co.
- Pacific Gas & Electric Co.
- Union Electric Co.

POWER REACTOR DEVELOPMENT COMPANY
- Alabama Power Co.
- Central Hudson Gas & Electric Corp.
- Cincinnati Gas & Electric Co.
- Columbus and Southern Ohio Electric Co.
- Consumers Power Co.
- Delaware Power & Light Co.
- The Detroit Edison Co.
- Georgia Power Co.
- Gulf Power Co.
- Iowa-Illinois Gas & Electric Co.
- Long Island Lighting Co.
- Mississippi Power Co.
- Philadelphia Electric Co.
- Potomac Electric Power Co.
- Rochester Gas & Electric Corp.
- The Southern Co.
- Toledo Edison Co.
- Wisconsin Electric Power Co.

YANKEE ATOMIC ELECTRIC COMPANY
- Boston Edison Co.
- Central Maine Power Co.
- Central Vermont Public Service Corp.
- Connecticut Light & Power Co.
- Connecticut Power Co.
- Hartford Electric Light Co.
- Public Service Co. of New Hampshire
- Western Massachusetts Electric Co.
- New England Power Co.
- Cambridge Electric Light Co.
- New Bedford Gas & Edison Light Co.
- Montaup Electric Co.

CAROLINAS-VIRGINIA NUCLEAR POWER ASSOCIATES, INC.
- Carolina Power & Light Co.
- Duke Power Co.
- South Carolina Electric & Gas Co.
- Virginia Electric & Power Co.

FLORIDA NUCLEAR POWER GROUP
- Florida Power Corp.
- Florida Power & Light Co.
- Tampa Electric Co.

MIDWEST GROUP
- Central Electric & Gas Co.
- Iowa Power and Light Co.
- Iowa Southern Utilities Co.
- Interstate Power Co.
- Mississippi Valley Service Co.
- Northern States Power Co.
- Northwestern Public Service Co.
- Otter Tail Power Co.
- St. Joseph Light & Power Co.
- Wisconsin Public Service Corp.

OHIO VALLEY GROUP
- American Gas and Electric Service Corp.
- Cleveland Electric Illuminating Co.
- Columbus & Southern Ohio Electric Co.
- Dayton Power & Light Co.
- Indianapolis Power & Light Co.
- Louisville Gas & Electric Co.
- Monongahela Power Co.
- Potomac Edison Co.
- West Penn Power Co.
- Ohio Edison Co.
- Pennsylvania Power Co.
- Southern Indiana Gas & Electric Co.

construct small-scale reactors of promising types without turbine generator facilities, at least initially. Omitting the turbine generator facilities from prototype projects of most reactor types does not in any sense impair the technical contributions which can be derived from design, construction and operation of such reactor types. Substantial advances in reactor technology already have been made through construction and operation of experimental power reactors, with no electric output, by the AEC.

Advanced Design Studied

A number of companies in our industry are studying advanced designs of nuclear power reactors. We expect that these activities will expand. Three organizations whose research and development work exemplifies our industry's activity in this field are Atomic Power Development Associates, Inc., which is supported by 33 electric power companies and 12 other business organizations, Nuclear Power Group supported by 7 electric power companies and one other business organization and the recently formed Ohio Valley Group made up of 12 companies.

In September of last year the Edison Electric Institute organized a Technical Appraisal Task Force on Nuclear Power. Inasmuch as the Task Force is submitting a statement to the Joint Committee for incorporation in the record of these hearings, it is not necessary to reiterate its membership or purposes. Electric power companies expect to look to this Task Force, as well as the AEC and others, for future guidance in carrying out their respective programs of nuclear power development. The technical reports of the Task Force will be made available to the Joint Committee, the AEC and others who are interested in the furthering of nuclear power development.

We would like to emphasize again the need for legislation to provide governmental indemnity with respect to nuclear power plants in addition to such indemnity insurance as now appears to be available commercially. It is understood that hearings on this subject are to be held at a later date and we would appreciate the opportunity to express our views to you at that time.

The Atomic Energy Act of 1954 contains a preference clause governing the disposal of by-product energy produced by facilities owned by the United States. As we have indicated to the Joint Committee previously, the Edison Electric Institute favors amendment of the 1954 act so as to provide a non-discriminatory means for disposal of electric energy to take the place of that now prescribed by Section 44. The Institute also advocates deletion of the preference clause relating to license applications as contained in the last sentence of Section 182 (C) of the act.

In summary, the past year was one of continued progress and significant expansion of our industry's program of nuclear power development. Present plans of electric power companies, both in construction of nuclear power plants and in study of advanced reactor concepts, comprise a comprehensive program. As additional opportunities or needs develop we expect that necessary further steps will be taken by our industry, with emphasis on advancing the technology and economics of nuclear power applications.

On behalf of the Edison Electric Institute, its Committee on Atomic Power, and its member companies serving 75 per cent of all electric users in the United States, I want to again express appreciation for the invitation to appear here today.

MEMBERS OF EDISON ELECTRIC INSTITUTE COMMITEE ON ATOMIC POWER

W. L. Cisler, President, The Detroit Edison Co., Detroit, Mich.
P. A. Fleger, Chairman, Duquesne Light Co., Pittsburgh, Pa.
G. M. Gadsby, Chairman, Utah Power and Light Co., Salt Lake City, Utah
A. S. King, President, Northern States Power Co., Minneapolis, Minn.
J. W. McAfee, President, Union Electric Co., St. Louis, Mo.
C. B. McManus, Vice Chairman, The Southern Co., Atlanta, Ga.
I. L. Moore, President, New England Electric System. Boston, Mass.
C. E. Oakes, President, Pennsylvania Power & Light Co., Allentown, Pa.
R. G. Rincliffe, Chairman, Philadelphia Electric Co., Philadelphia, Pa.
H. R. Searing, Chairman, Consolidated Edison Co. of N. Y., Inc., New York, N. Y.
Philip Sporn, President, American Gas and Electric Co., New York, N. Y.
N. R. Sutherland, President, Pacific Gas and Electric Co., San Francisco, Cal.
Chairman: Edgar H Dixon, President, Middle South Utilities, Inc., N. Y., N. Y.
Vice Chairman: E. L. Lindseth, President, The Cleveland Electric Illuminating Co., Cleveland, Ohio

Cost of Federal Projects with Power Installations

FEDERAL projects with electric power installations have cost $6,970,000,000 through the fiscal year ending June 30, 1955. These are the so-called multiple purpose projects started under the guise of flood control or navigation benefits. Power production has now become the dominant factor in many of these projects. Amounts spent by TVA and the Columbia River Power system account for over half the total expenditures. The amount allocated by TVA to electric power represents 80 per cent of its total investment while the amount allocated to power by the Columbia River power system is equal to 71 per cent of its total investment. The largest investments have been made in the states of Tennessee and Washington, each state having received over 17 per cent of the total expenditure.

Eighteen states which pay 55 per cent of the total Federal taxes have no Federal power investment. Taxes collected from these states have made possible the construction of these projects and non-payment of Federal taxes by the Federal agencies distributing this power and by the preference customers who distribute this power have further increased the tax burden of these states and other states with small Federal power investments.

The claim often made that Federal power operations increase the Federal taxes paid because of increased economic activity is not supported by the record. Most of the power generation and distribution in Tennessee was taken over by the TVA system in 1939. Between 1939 and 1955 the Federal tax collections in Tennessee increased 15.5 times whereas the Federal tax collections increased 23 times in South Carolina and 19 times in Georgia during the same period.

Revenues received by Federal agencies for this government power during the fiscal year ending June 30, 1955, amounted to $289,000,000. No Federal taxes were paid on these sales and only very small amounts in lieu of state and local taxes. TVA paid $3,878,000 in lieu of state and local taxes out of revenues of $188,000,000. The only other Federal project that paid sums in lieu of state and local taxes was the Boulder Canyon project which paid $300,000 each to the states of Arizona and Nevada as required by law.

There is a considerable avoidance of taxes by the preference customers in the retail sale of the government power. These are local groups including municipalities, state district projects and cooperatives. Strangely enough the Federal government is not considered a preference customer by the public power laws. These preference customers purchased about 27,730,000,000 kwhr of energy generated by these Federal projects during the fiscal year ending June 30,

(*Continued on page* 52)

Youth's Opportunities

in an Expanding Universe

By Walker L. Cisler
President, The Detroit Edison Co.

An address before the National Edison Birthday Celebration, New York City, Feb. 11, 1957

IT is very appropriate that this first Science Youth Day coincides with the 110th birthday of Thomas Alva Edison. I can think of nothing that would have pleased him more than to know that his influence continues to motivate the youth of the world.

As our foundation president, Charles Kettering, has said: "Today's exciting era of rapid discovery and almost unbelievable technological progress offers young people with inquisitive minds—and a good education—scores of richly rewarding opportunities that were not even dreamt of 50 years ago. One Thomas Edison in a generation is no longer enough to sustain our kind of progress. Today we literally need thousands of well-trained young people with the kind of vision, imagination and courage that took Edison on his lifelong conquest of the unknown."

In these eloquent words Mr. Kettering sums up a significant truth that has impressed all thoughtful observers in the world today. Our young men and women face an expanding universe of unbelievable opportunity in the search for nature's secrets.

Climate is Favorable

Thomas Edison, like ourselves, was fortunate to live in a country that provided a climate favorable to the full use of his talents. Scientists, engineers and inventors need more than training and equipment for their work. History shows that the society in which they live must also favor free inquiry and affirm the rights of initiative.

The patriots of our great American tradition have bequeathed to us a system of free competitive enterprise that provides dynamic incentives for individual effort, with personal rewards when experiment is followed by success. This climate of freedom and democracy, together with basic resources in our land and its people, has permitted us to attain the highest living standard the world has ever known. If we can hold to what is good during our stewardship of this great tradition, and help the young men and women of today along the path to achievement, then the past is but prelude to what the world may yet accomplish.

Although our standard of living is the object of attainment for people everywhere, I am made deeply conscious, as I travel in other countries, of four serious unbalances. These concern population, material resources, energy and its utilization.

Help Needed

These out-of-balance relationships affect social, economic and political stability everywhere. They cannot be corrected by the physical sciences alone. We will need help from the social sciences, from medicine and education, from economists, from every discipline that the inquiring mind and the conscience of man has developed. We will need all the brains that the world can muster—and the greatest potential resides, of course, in the world's youth. We will require broad capability as well as specialization, the insight of the arts, the techniques of management and statecraft—not just from a few nations but from all nations.

One hopeful sign is the increased communication between peoples of the free world. Students, scientists, engineers and others, through interchange of information, are taking back to their respective nations the benefits of progress achieved by helpful neighbors. Any nation that trains its youth in the light of international knowledge greatly accelerates its progress and develops the resourcefulness of its own people.

Wherever I go I find that young men and women are seriously concerned about the problems of the modern world and very interested in science's potential effect on their lives. Last summer in the Republic of Korea I was asked to talk with some 600 students at the Seoul National University. Their eagerness to learn about the atom was equal to that of any similar American group.

At the time of the dedication of a power plant in Greece I was delighted by the interest of parent and child alike as they literally climbed over the equipment. I am sure they sensed its power and the new impact of technology on their way of life. I saw many of them pick up a piece of coal and stare at it curiously.

Last fall in Chicago, before 1,400 high school students at the Trade Fair of the Atomic Industry, I joined with representatives of education and industry to discuss the opportunities that would be open to young people with good scientific training. I have seldom seen a more alert audience or a more gracious one despite its large size. Their questions would have done credit to an audience far more advanced in years, training and experience.

A study of the history of science is one of the most fascinating projects that I can recommend to anyone. Discoveries are often profoundly interrelated, although there are often extensive periods of intermission in their further development. This emphasizes to me the importance of a thorough grounding in the literature of science as a source of fertile inspiration.

Science-Life Relationship

A man could have gone to sleep about 400 B. C. at the time when Democritus proposed the existence of the atom and awakened in 1500 A. D. without noting much change in the world about him. In fact, as Alfred North Whitehead has pointed out, the Europe of 1500 knew less than Archimedes, who died in 212 B. C. This indicates an absolute relationship between science and human life.

Around 1662 Boyle described the classic experiments that showed the quantitative relationship between volume and pressure in a gas. He

noted that temperature had some influence. Nevertheless, it was not until 1787, more than 100 years later, that the exact relation between temperature and volume of gases was worked out by Charles.

The Edison Effect of 1882 became the radio of the Twenties and the television of the late Forties. Einstein's mc^2 of 1905 became the Power Demonstration Reactor Program of the Atomic Energy Commission in 1955. Thus we learn that there are inherent delays between the initial concept in research and its development into something useful to man. Research, in a sense, is the youth of that mature citizen of the world, technological achievement. We just can't have enough of the latter without plenty of the former.

Because energy is my hobby as well as my business, I would like to speak about it briefly. Human progress through the ages has been largely the development of such devices as the wheel and lever, which make it possible for man to do more things than he can do with muscle power alone. Progress was slow, however, until he discovered how to use the kinetic energy of falling water and the stored heat energy of wood and fossil fuels.

Power and the Living Standard

The industrial revolution in the 18th century followed the discovery of how steam could make mechanical energy. Dramatic as this change was on human affairs, it took more than 100 years to develop a power resource of one horsepower per industrial worker. Since that time we have lengthened and strengthened man's arm at a much higher rate. Today's worker in the United States has an average of 10 horsepower at his command for production, largely through the availability and convenience of economical electrical power. I think that you will agree that this is one of the principal reasons for our high standard of living in America.

It was here in New York City in 1882 that electric power had its beginning in the Pearl Street Station under the leadership of Thomas Edison. Today the kilowatthour, an absolute quantity of energy, is in demand throughout the world. It has even reached the importance of serving as a medium of economic exchange between countries of Western Europe.

From 1882 to the present, the changes in power generation have been largely refinements in the conversion of the heat energy stored in fossil fuels. The recent discovery of how to convert the energy stored in the nucleus of the atom into heat has introduced a totally new energy concept.

Opportune Atom

The potential sources of nuclear energy are probably more than 23 times greater than all known conventional fuels. To go that far, however, we will have to make full use of nuclear materials, with help from our growing understanding of fast breeder technology. Since civilization is completely dependent upon energy—and since we can already foresee the approaching depletion of fossil fuels—the timing of the discovery of nuclear energy has been little short of providential.

There is a further hope that may increase our energy resources virtually without limit. It may be possible to make practical use of the principles of hydrogen fusion observed in the sun. Dr. Amasa Bishop of the AEC has said that there is enough deuterium in the ocean to provide all of mankind's present power requirements for many hundreds of millions of years. Here in broad strokes are breathtaking possibilities that can kindle young minds to the most dedicated effort.

And here is another challenge: We must look for a means of converting nuclear energies directly into electricity on a large scale, without an intermediate energy transfer through heat and steam. Any of these things may come to practical realization some day through greater understanding of phenomena being written into the literature of science today.

Young scientists are already making excellent progress in many fields associated with the atom: For instance, there is Dr. Donald Glaser of the University of Michigan, who is 30. He has developed a new experimental instrument called the bubble chamber. It has become the single most important experimental device for studying behavior of high energy particles. I might also mention two brilliant Chinese-born theoreticians, Professor Lee of Columbia, 30 years old, and Professor Yang of Princeton, 34 years old. They questioned the principle of parity in nuclear physics and I understand that recent experiments have proved them correct. This may set off a far-reaching reappraisal of our understanding of the universe.

It has been estimated that the atomic power field in itself can put to excellent use 10,000 trained men and women in the next two years. But this is only one of the many fields offering opportunities for exploration and discovery. The horizons are as limitless as the heavens that surround us. Let us remember, too, that behind any major breakthrough there is the extensive research of many scientists, and that every practical application calls for supporting achievements in many engineering fields. In turn, the breakthrough opens the way for further investigation in a widening circle. With this evolution the benefits to mankind increase almost in chain reaction.

Atomic Field Needs Men

The needs and opportunities are so many that I can only mention a few that come readily to mind:

1—We must meet the needs of the world's rapidly increasing population for food and housing. This requires new ideas in both fields. Civilization rests upon a few inches of topsoil, which must be conserved and improved. We must also look to the possibility of developing new food sources grown in the sea or in man-made facilities without soil.

2—Health: There is much to be done in the study of man as a physical, mental and spiritual being.

3—Group dynamics: There is much to learn about man in his relations with other people.

4—We must conserve and utilize all natural resources and many substances now called waste products.

5—Chemists will be asked to replace many natural resources and to try to do a better job than nature did in the first place. I include here the chemical use of our fossil fuels, once we decide not to burn them up any more.

6—We need new materials to withstand great pressure, stress, temperature and deterioration. Despite all we know about metallurgy

we still have to over-design many conventional products just to be sure. Advances here will also open the way for great progress in aviation, weapons and atomics.

7—There is need for new ideas in low-cost transportation to meet the growing needs of metropolitan areas as well as to increase the mobility of people, materials and machines throughout the world.

8—We must acquire a fuller understanding of weather and possibly do something about it.

9—The conservation of water resources is becoming increasingly important. Without water neither agriculture, industry nor mankind can exist.

10—It would be wise to supplement our fossil and atomic energy resources with some of the sunlight that is not already converted by plants and weather. Promising avenues of research already indicated include solar batteries, stoves, crucibles and an independent chemical process similar to photosynthesis.

11—There is much to be done in the new science of solid state physics, of which the transistor is an example, already a useful servant to man.

12—There are also outstanding opportunities to develop electrical control systems with a reliability and adaptibility much greater than the human mind itself provides.

Other Fields Challenge

And there are other fields just as challenging. While everywhere we detect a great concern for the scientist and engineer—and rightly so—yet we must not forget that this is only part of a larger problem involving the need for competent people in all walks of life. Our objective must be the full development of all our intellectual resources.

A boy or girl not motivated to use his talents is not unlike unrefined gold in a mountain in Utah. Such talents are of little value until the individual is awakened to the possibilities for training that exist in America today. It is unfortunately true that our country does face a shortage of teachers and educational facilities. Industry must look upon the problems of education as its very own and cooperate in solving them. Unless we develop every individual to the maximum of his abilities we will fall short of making the best use of our Number One asset—the human resources.

It will cost a lot of money to educate the technical minds we need—and it will cost a lot of money to provide them with the facilities needed to advance the world's already complex knowledge. It has been estimated that in the United States alone the current cost of research is around $5 billion a year.

There will never be a substitute for the genius and hard work of the individual, as evidenced in Thomas Edison. One has only to visit his laboratory, now at Dearborn, Mich., to note the simplicity of the tools and materials he used. In some ways the research facilities now used by young scientists make their job easier, but on the other hand they need greater professional training. Each scientist is also learning how to work on technical teams that combine diverse disciplines, aided by the leverage provided by the extraordinary tools of modern research. These new forms of assistance bring new opportunities as the widening circle of knowledge reveals more of the silent shore of the unknown.

How can young people help to motivate themselves for the exciting work that lies ahead? Again they can look to Thomas Edison. In general, ignorance has a depressing influence, but there is the honest ignorance that seeks knowledge. Edison was never depressed by what he didn't know, rather he found it exciting to find out. By what we are, by what we say and do, we must help young people to experience the joys of intellectual attainment and endless exploration. We must help them to feel at home in the world of education, industry and government.

To the inquiring mind, the world itself and the universe around us are ever young and full of promise. Theories and philosophies may become dated, but the splendor of that vast atomic reactor, the sun, rises every morning over the eastern rim of our extraordinary planet. The search for truth is possible because the mystery of nature and the intelligence of man fit like sword and sheath.

Never before has history made it clearer that man does not live by bread alone. He needs direction in

(*Continued on page* 58)

Edison's Home Becomes Historic Shrine

GLENMONT, Thomas A. Edison's home and "thinking bench," as he called it, was dedicated as a national historic site recently.

The gabled, 23-room red brick mansion is in Llewellyn Park, a residential area a mile from the late inventor's laboratory in West Orange N. J.

A bronze plaque designating Glenmont as a historic site under the aegis of the National Park Service of the Department of the Interior was unveiled by Mrs. John Eyre Sloane, daughter of the inventor.

Both Mrs. Sloane and her brother, Charles Edison, former Governor of New Jersey, paid tribute to their mother, the late Mrs. Mina Miller Edison. Mr. Edison noted that "in our home, as in all loving and happy homes, there was more matriarchal than patriarchal influence."

Conrad Wirth, director of the National Park Service, said his department was "honored to join in the protection of the Edison heritage." He pointed out that the library over the entrance of the inventor's home was where many of Edison's inventions had been conceived. He recalled the inventor's definition of genius as being "two per cent inspiration and 98 per cent perspiration."

Edison, who at the age of 12 was a railway "news butcher," or newsboy, was a telegraph operator before he became an inventor. When he finally put his mind to inventing, he came up with a simplified stock quotation printer; the phonograph; the incandescent light; a motion picture camera; the fluoroscope, and a variety of other inventions.

During his lifetime he received 1,097 patents from the United States Patent Office. He died in 1931 at the age of 84.

Glenmont is the seventeenth site designated under the National Historic Sites Act of 1935. In accord with provisions of the act, title to Glenmont remains with the McGray-Edison Co., with any alterations on the site subject to approval of the park service. Arrangements for public visits to Glenmont will be made jointly by the owners and the park service. The exercises were a part of the observation of the inventor's 110th birthday.

Second Street Tree, Utility Conference to Be Held in Cleveland, March 7-8

THE final program for the Second Street Tree and Utility Conference to be held in Cleveland, March 7-8 has just been announced by conference co-chairmen J. W. Anderson, Edison Electric Institute; K. M. Reid, Illuminating Engineering Society, and E. H. Scanlon, National Shade Tree Conference.

The conference, sponsored by EEI, IES and NSTC, is expected to attract more than 300 representatives from groups interested in tree, wire and street lighting problems. The meeting is designed to promulgate the fundamental concept that, through proper selection of street trees and their correlation with street lights and utilities' overhead lines, all can harmoniously occupy the same street to the advantage of the general public, the municipality and the utility industry.

The conference is of vital interest to the electric utility industry because of the major influence of trees on service continuity and operating costs. Underscoring the importance of this concept is the fact that about 40 per cent of the registrants at the first conference in March, 1955, represented electric utilities across the nation. Nearly five thousand copies of the proceedings, published under the title "Our Streets Can Be Beautiful—and Useful," have been sold.

Several EEI member companies are now engaged in street tree programs and since the first conference the fundamental philosophy of "trees to fit the space" has continued to receive nation-wide attention and endorsement. The 1957 conference broadens the base of this concept by bringing in related groups interested in the development.

At the 1955 conference the three represented groups, through general agreement on both objectives and means of achievement, demonstrated confidence that tree problems can be solved progressively through mutual cooperation and concentration on a program to promote public acceptance of planned tree planning.

The wide interest in this subject is illustrated by the roster of speakers scheduled for the 1957 conference at Hotel Cleveland. They include a representative of an electric utility company, the editor of *The Cleveland Press*, the mayor of an Ohio city, a landscape architect, a representative of the National Association of Home Builders, the director of the National Arboretum in Washington, D. C., and many others.

Of the conference, Edwin Vennard, managing director of Edison Electric Institute, said: "The conference provides an important opportunity for all concerned to reach a better mutual understanding of the problems involved. To the public and electric utility industry, this concept offers an opportunity of tremendous potential value, and we urge full support of the conference by member companies."

The program follows:

THURSDAY, MARCH 7

MORNING—10:00 A.M.

Chairman—John W. Anderson, Edison Electric Institute

Trees and Utilities—Vital Components in Community Development, Harry T. Sealy, Vice President, Cleveland Electric Illuminating Co., Cleveland, Ohio

Keynote—Summary of First Conference
Professor H. O. Perkins, University of Connecticut, Storrs, Conn.

Progress Since the First Conference—Case Histories
California
Cleveland
Connecticut
Detroit
Philadelphia

AFTERNOON—2:00 P.M.

Chairman—Kirk M. Reid, Illuminating Engineering Society

Theme—Trees in Our Communities

The City Planner Looks at Long-Range Street Design
S. A. Kaufman, Cleveland, Ohio—American Institute of Planners

Design Principles of Tree Use To Fit Space and Environment
Markley Stevenson, Philadelphia, Pa.—American Society of Landscape Architects.

Value of Effective Tree Use in Home Building
E. R. Carr, Washington, D. C.—National Association of Home Builders

Arborists Can Help Achieve Understanding and Co-operation
M. L. Davey, Jr., Kent, Ohio

DINNER—6:30 P.M.

Chairman—K. M. Reid, Illuminating Engineering Society

Address — This Street Program from an Editor's Viewpoint, Louis Seltzer, Editor, *The Cleveland Press*

FRIDAY, MARCH 8

MORNING—9:30 A.M.

Chairman—Edward H. Scanlon

Theme — The Long-Range Street Tree Program

Why We Need a Street Tree Program
Stephen T. Zona, Mayor, Parma, Ohio

Street Tree Programs in Operation,
John Michalko, Commissioner of Shade Trees, Cleveland, Ohio
Robert B. Henn, Superintendent of Parks, Euclid, Ohio
Leonard F. Anderson, Secretary Shade Tree Commission, Essex County, New Jersey

Selection and Propagation of Functional and Ornamental Trees
Henry T. Skinner, Director, National Aboretum, Washington, D. C.

Practical Aspects of Marketing Street Trees
James I. E. Ilgenfritz, Monroe, Michigan

AFTERNOON—2:00 P.M.

Chairman—Kirk M. Reid

FORUM

PANEL—ALL SPEAKERS
Questions and discussions from the floor

CONFERENCE SUMMARY — AND THE NEXT STEPS
Professor H. O. Perkins, University of Connecticut

(*Continued on page* 64)

Systems Planning for Computer Application

By Howard S. Levin
Consultant, Ebasco Services Inc.

THE electronic computer is a key factor in building information systems compatible with the demands of today's business. In a very real sense these machines represent a major breakthrough in systems planning.

The term electronic computer is applied to many kinds of gadgets. There are special-purpose computers which perform such specialized operations as keeping track of airline seat availabilities or furniture inventories. There are general-purpose computers, which, true to their name, may be used for nearly any data processing activity. And within this category, there is a wide range of machines by size, shape, cost, and performance. Some computers are essentially replacements for portions of a punch card installation. Others are small engineering calculators, and still others represent nearly fully automatic approaches to an integrated set of office operations.

Electronic Office

Such machines as "Datamatic," "Bizmac," the "IBM 705," and the "Univac" make heavy use of magnetic tapes, high speeds of internal operation, and powerful machine logic to allow automatic handling of a wide range of office activities. In many senses, these machines allow us to approach the concept of an electronic office.

Exploitation of computer potential provides substantial challenge to the systems planner. He must adapt himself to practically unlimited computational ability, invisible records, rapid search, and the procedural rigor demanded by computer programming. Further, he must recognize that computers are more than new tools for doing old jobs. Rather they are tools around which effective procedures based on information use can be designed.

From many standpoints the limitations of past office work systems can be put aside with computer use. The eighty or ninety-column card, the number of registers in a bookkeeping machine, the speed of human operations, or the extent of human memory are not constraints under computer use. Digital computers broaden the ability of the systems planner to process information. This ability coupled with integrated data processing equipment and with recent scientific advances in administrative control enables the systems planner to design a truly effective, integrated information system attuned to the needs of his firm.

Sound Approach

Such design requires an approach and methodology characteristic of the engineering sciences. Engineering of effective computer systems requires the same objective measurement and test found, for example, in weapons systems engineering. Information engineering focuses on discovery of information requirements and on evaluation of alternative procedures for meeting them. The information needs of a firm are not necessarily the output of present procedures. Current methods are often a patchwork imposed by machine limitations, supervisory inflexibility, and reaction to business emergencies. As a consequence, the information required for policy guidance and day-to-day operation of the business may not be clearly reflected by current office activity.

Nevertheless, present procedures provide a starting point for redesign of a business information system. They picture the way in which the firm is currently operated, reveal the emphasis presently placed on various aspects of the office work cycle, and provide a basis for viewing office costs. With present procedures as a starting point, the information engineer can work toward a statement of basic information needs. Initially he will gain only an approximation of such needs. But this approximation is valuable in judging the feasibility of computers and choosing among competitive machines.

A computer system evolves in three major stages. These are:

Stage I—Analysis of Present Information Flow Patterns and Discovery of Fundamental Requirements;

Stage II—Development of System Concepts and Selection of Equipment;

Stage III—System Implementation

These stages take place consecutively and the completion of each affords an opportunity for top management review and evaluation. At each stage, understanding and support at the upper levels of company administration are required since far-reaching changes in company procedure may prove desirable. Positive attitudes toward change, particularly in the middle management group, must be won through both top management support and the persuasiveness of the systems planner.

Investment, Personnel Vary

The number of people and the investment required in design of an information system vary with the scope of the work undertaken. For limited areas, system design can be a modest undertaking. But where the total information system of a large and complex business is under study, the job of system design and implementation rises sharply in magnitude. Yet the design of an information system on the widest possible basis is important to satisfaction of management needs and efficient utilization of computer potential. Computers and other data processing equipment are poorly used if they bring but piecemeal efficiency to office tasks.

The design of a business information system is a creative undertaking. Brute force will not build an information system that serves management objectives. Although I will suggest steps of system design and implementation, there is no mechanistic plan

for achieving a good information system. Progress in this direction cannot be measured by procedural documentation or the extent to which computer specifications are dissected. Both are necessary elements. Yet like good wine, these elements achieve the optimum effect in just the right amount.

Planning a computer system starts with a look at present procedures. This study of present procedures could range from detailing the steps performed by each clerk and office machine to a general description such as "payroll checks are prepared from time tickets." Probably a middle course is desirable in developing useful patterns of information flow. A detailed recital of present procedures, in fact, may obscure fundamentals under an onslaught of methodology inspired by custom and existing office equipment rather than by information needs. Emphasis can too easily be diverted from information flow to paper flow. Real effort is necessary to "see through" present procedures and gain insight into their basic structure.

Once information flow is understood you have a start, but only a start. More important are the uses of information within the company. This should be most carefully followed. How is information used for management decision, for operating control of company activities, for accounting activities? This stage involves questioning and review of established business policies and practices bearing on office procedures. The systems man can profitably consider how well the policies reflected in clerical activity serve the interest of the firm.

It is also essential to determine the information need arising outside of the firm. What are the external requirements imposed by the external auditors, by the firm's creditors and by federal, state, and local governments who may or may not regulate company affairs but who certainly do tax company property and profit. Next we should ask what information needs are not met by current procedures. What information would be useful if it could be obtained when needed at an economic cost?

These factors of information use along with present costs for data processing allow the basic direction of further systems study to be determined. What is the technical and economic feasibility of electronic data processing? What are practical levels of automaticity to strive for in data processing? What potentials exist for use of newer managerial techniques? Taken together the answers to these questions give us an indication whether we should be looking at a $1,000,000 "Univac," a $50,000 "Bendix G-15," or whether we should be congratulating line management on having already neared perfection.

Usually at this point the alternatives narrow. Perhaps the largest equipment is priced out of the running. Possibly, the potential dollars exist for either large or medium-scale equipment but medium-scale equipment lacks needed capacity for required data processing. Perhaps the outlook for any form of electronic data processing is dimmed by review of requirements to be met and the dollars available to meet them.

Management Questions Arise

But let us assume that significant potentials exist for computer application. It is likely management will have some questions of its own. What are the next steps? How much do they cost? When do the benefits arrive? Some of the people I have talked with have been burned on answers to similar questions. It is easy to be too optimistic but it is unnecessary to be overly pessimistic. At this point management encouragement for additional study is more appropriate than purchase orders for new machines. A green light is needed for further and more specific planning. Once this is obtained the job becomes one of outlining system requirements in the light of computer capabilities. This is the time for rethinking system requirements. This is the place for creative imagination. A system must be evolved that meets the information need of management for both policy guidance and operational control. The system should exploit, wherever useful, the computation and search abilities of electronic computers. Above all, the system should achieve procedural efficiencies through integrating the parts of related data processing activities. The pieces of a problem that have become separate through organizational drift and the limitations of present equipment should be put together again.

At this point, systems requirements can be projected against various general and special-purpose computers. The systems implications of each data processor can be considered in terms of equipment items necessary, operating personnel required, and information outputs. Systems characteristics along with machine characteristics and machine costs allow us to choose among various computer system elements. This is not an easy choice. In some situations a single large-scale machine will be weighed against combinations of smaller machines. Decisions must be reached about input and output devices, about communications equipment, and about data conversion machines. The flow of new machines and new options for older machines has complicated the task of selection greatly. System requirements should be considered flexibly as machine specifications are viewed so that the most effective marriage of machine and system can be arranged.

The emergence of a system outline at this stage is a demanding and challenging task. System planning will have a fundamental bearing on company operations. While carefully considered objectives and sound planning are basic to any systems work they are particularly so in computer application. Failure to understand problem complexities or implementation difficulties or to obtain coordination of proposals will be very costly in the programming stages of computer application.

Once a system outline and a combination of machines to implement the system have been set, new considerations come to occupy the center of the stage. These include the impact of new system concepts on company operations, the cost, and the problems of system implementation. Management approval of time, personnel and money is needed to carry system proposals into system realities. But more than approval is needed. Management enthusiasm is necessary to insure that acceptance is won even by those whose prerogatives are threatened.

Computer selection is ideally based on a broad view in information needs. Once selection is made, the emphasis shifts to the specifics of those information requirements. These must now be stated in the minute detail of computer routines. The development of these routines constitutes a major portion of system implementation.

Careful problem definition is a prerequisite to effective computer use.

Actually, problem definition began during equipment selection. It must now be carried much further and shaped to the computer chosen. Problem definition begins with a picture of current procedures. As we have stressed, it does not end there. Procedures interwoven with the mechanics of current data processing are considered in the light of information needs in constructing the outline of an electronic data processing system. Now in system implementation there must be an absolutely complete statement of the job to be done. Each step of the procedure must be explicitly stated with a precision not generally found in business information handling.

Planning Comes First

Programming a complex data processing operation is a task in which firm guides are not yet established. Automatic coding methods will shorten the actual job of machine instruction, but automatic coding is no substitute for the planning that must precede computer application. The system planner through problem definition must establish the framework in which automatic coding can be used. Yet we should not envision a sharp line between problem definition and computer utilization. System implementation is not a matter of setting down the specifics of an extensive business problem in great detail and turning programming talent loose on this detail. Probably no initial view of an involved data processing activity will give rise to efficient programming.

Where a large, complex business system is concerned, a prior determination of all procedural detail which allows effective computer use and meets the information needs of the business seems unlikely in view of the staggering complexity of both the computer and business. The result may be a tendency toward empirical procedures design in computer application. Under this concept, finalized computer routines would emerge from computer test and from evaluation of problem segments. Procedures planning becomes dynamic with the computer, a tool of the planner as well as the instrument by which data processing is accomplished.

We have concentrated on computers, but I want to emphasize that computers represent only one tool of the systems planner. Computer application can be likened to one front of a systems revolution aimed at replacing wherever necessary unwieldly procedures, inadequate information, unreasonable costs, ineffective administration and organizational inertia.

Aside from computers there are some other fronts in this battle for more effective business operations.

Certainly, integrated data processing has increased accuracy and lowered costs through eliminating repetitive handling of information. Integrated Data Processing is making a major contribution to the job of getting information to the place where it is needed, when it is needed, and in a form permitting its efficient use. More achievement in integrated processing equipment and application is certainly on the horizon.

But there is an even more important tool that the systems man can present to the executive. It is the use of scientific methods to aid executive decision. The systems man has a key role in promoting and applying the methods of scientific management. These methods will shape the outlines of tomorrow's business systems by establishing new requirements for information and permitting us to abandon some of what we do today. Basically, I think that business systems will have a greater orientation toward the uses of information. We will in many cases replace quantity of numbers with quality of information. We will call attention to the different and the significant. We will most likely process information in strange and complex ways to apply new scientific knowledge to business activities.

Executive Decision Problems

Much work is being done in studying executive decision problems. Government, industry, and the university researcher are contributing to the scientific appraisal of managerial processes. Their work is attracting wide attention under the names operations research and management science.

The scientists, like the engineer, works by measuring, developing mathematical expressions, exploring alternatives, and testing conclusions. Essentially operations research applies engineering methods to administrative areas. This doesn't mean that operations research is necessarily different from present management activities. But science is a demanding taskmaster and we will likely find that operations research is more formal in its approach than is now the general rule. By this I mean that greater emphasis is placed on measurement of business factors and on the mathematical relationships among these factors.

Operations research can be defined as a scientific approach to evaluation of alternatives under control of management.

As such, operations research has four characteristics:

a) *It is objective.* Neither preformed conclusions nor the personal leanings of the study group are allowed to limit the questions asked or to affect the pattern of investigation.

b) *It is based on measurement.* Operations research depends on observations and measurement. In many areas where direct measurement is not possible, every effort is made to obtain reasonable estimates or ranges of probable values.

c) *It develops an analog or model of the system being studied.* Frequently, a complex management problem can be characterized in terms of numbers or symbols. This kind of model, called a mathematical model, enables a testing of alternatives and use of mathematical techniques from maximizing effectiveness or minimizing cost.

d) *It tests conclusions wherever possible and modifies the study as a result of test.*

The application of these principles to military and business problems has spurred many new areas of study. Some of these are:

Linear programming, or allocation of limited resources to competitive demands so as to optimize some management objective.

Queueing theory, or the study of how service waiting time, capacity to serve, and customer demand interact.

Statistical decision theory or the study of decision making under uncertain knowledge.

Replacement theory, the determination of the most economic policy regarding replacement or mainte-

nance and the study of mass replacement problems.

Theory of games, the study of competitive situations and the formulation of actions, reactions, and counteractions designed to increase the chance of winning a competitive battle.

But operations research should not be viewed as a group of slick techniques in search of a problem. Rather operations research is directed to problem solution and calls upon whatever techniques are useful in problem analysis. By taking an objective, thorough and formal approach to management decision problems, operations research can take advantage of new methods of scheduling, organizing and controlling company activities.

Thorough Research

Because operations research is a scientific discipline, it is thorough and painstaking. In the scientific tradition, conclusions are reached only after all pertinent data have been gathered and scrutinized and full discussions of implications have taken place. Of course, good management already stresses these same principles, but in operations research we find a full-time conscious orientation toward complete examination of possible factors and use of advanced techniques in making that examination.

In considering computer usefulness within the firm the operations research potentials may be considerable. The computer load generated by linear programming, for example, can be very great. Computers, in fact, make possible use of operations research techniques that would be totally unfeasible under more manual methods. In many cases, operations research potentials tip the scales toward computer acquisition for an otherwise undecided management.

But in another sense, operations research is related to computer planning. The objectivity, measurement, and careful evaluation stressed by the "opsearcher" is especially appropriate in system planning for computer use.

We are just beginning the computer age. Acceptance of computers in one short decade has been remarkable. In the decade ahead I believe that sound computer planning will bring a profound and beneficial change to offices both large and small.

Atomic Power Plant Scheduled by Northern States

PLANS for the construction of a full-scale atomic power plant of advanced design have been announced by Allen S. King, president of Northern States Power Co., one of a group of participating electric utility companies from the midwestern part of the nation.

Plans contemplate a 60,000-kilowatt plant estimated to cost from $20 to $25 million.

The plant is planned to be completed by 1962.

Subject to the approval of the Atomic Energy Commission, the plant would be located on a site yet to be chosen on the system of Northern States Power Co., which would own and operate the plant. This system was chosen because of its size and the extent of its transmission system and the company's ability to meet any production delays or difficulties that may occur during preliminary tests and experimental operation. Major interconnections between companies will permit energy produced by the atomic power plant to flow into the systems of the participating companies.

Finance Group Formed

Mr. King also said that his company and other utility companies located in Iowa, Minnesota, Missouri, North Dakota, South Dakota and Wisconsin are forming a corporation for the purpose of jointly financing research and development work associated with the construction of the plant. Negotations are under way with Allis-Chalmers Manufacturing Co. of Milwaukee, and Pioneer Service & Engineering Co. of Chicago, as prime contractor and architect-engineers, respectively, is was revealed by the president of Northern States.

Mr. King said that plans for a controlled re-circulation boiling water reactor have been under detailed study by Allis-Chalmers and that he believes new elements in the design may make a significant contribution toward bringing the generation of electric power from atomic energy into a competitive position with conventional plants. He said that this plant is a logical progressive step in the further development of the boiling water reactor and is the outgrowth of several years of research and development work carried on by a nuclear reactor study group comprised of many of these participating companies.

The participating companies will share in the substantial additional costs involved in construction and initial operation of this atomic plant above similar costs associated with a coal burning power plant.

Participating Companies

Participating companies in the program are: Northern States Power Co., Minneapolis; Mississippi Valley Public Service Co., Winona; and Otter Tail Power Co., Fergus Falls, Minn.; Interstate Power Co., Dubuque; Iowa Power and Light Co., Des Moines.

Also Iowa Southern Utilities Co., Centerville, Iowa; Wisconsin Public Service Corp., Milwaukee.

Also Northwestern Public Service Co., Huron, S. D.; St. Joseph Light & Power Co., St. Joseph, Mo.; and Central Electric & Gas Co., Lincoln, Neb.

Additional companies are considering joining this group in the near future as plans develop.

Announcement of this full-scale atomic plant brings to 19 the number of atomic plants presently planned to be built in the United States at an estimated cost of $675,000,000. Total generating capability of these plants will be nearly one and one-half million kilowatts.

Three are scheduled to be in operation this year and the rest of them by 1962.

More than 60 utility companies have united to build and operate ten of these 19 plants which will be located throughout the nation.

Cost of Federal Projects

(*Continued from page* 44)

1955. The price received for this power at retail by these preference customers is not available but had the power been sold at the average price of 1.67 cents per kwhr the same as that received by the electric power industry in the U. S. the amount received after allowing for a 10 per cent line loss would have been about $417,000,000. Based on the U. S. average the investor-owned utilities would have paid $60,800,000 in Federal taxes and $37,500,000 in state and local taxes on this amount of revenue.

Pinpointing Responsibility for Deviations from the Operating Budget

Prepared by a Project Committee of the EEI-AGA General Accounting Committees*

THE word "budget" means many things to many people. Budgets may be as diverse as industry itself and can be the greatest single management tool which may spell the difference between the success or failure of the business enterprise.

Industry cannot, as the saying goes, fly by the seat of its pants. It must have clearly defined objectives and goals based on well established standards of performance or, stated another way, it must have:

1. Before-action planning.
2. During-action review.
3. After-action analysis.

With this three-step approach to good management, let us analyze just how this formula applies to the title of this discourse on pinpointing responsibility for deviations from the operating budget.

Prerequisite to the long-range success of an enterprise is the decentralization of responsibility and authority — thus delegating to the man on the "firing line" the responsibility for making decisions close to the scene of the actual operations.

The delegation of responsibility and authority ensures "planning" by the very people who are overseeing the "doing." This is not the ivory tower approach so common when conditions were less complex. There is a challenge in delegation that only the insufficient or inadequate at any managerial level will reject.

A system that is devised to include all supervisory personnel in the planning phase of management is a system which compels performance.

"Responsibility" or "functional" accounting represents a great step forward in compelling enlightened planning through more meaningful and realistic budgeting or forecasting.

Inherent in any system of functional or responsibility accounting is the requirement that each member of management plan or forecast for his particular segment or element of the company.

Conversely, then, it should follow that he must account for or report back on any significant deviations from that plan. These briefly are the techniques of putting into practice the concepts of before-action planning, during-action review and after-action analysis.

With these three concepts in mind, let us outline a system or plan, the principles of which would fit any organization.

Before-Action Planning

Annual budget planning reports prepared on a pyramiding basis by organizational levels within a chain of command.

These reports would provide the means of coordinating the planning within the major elements of a company. Plans would be started and goals recorded so that prompt action could be initiated when deviations are noted. More importantly, it establishes an atmosphere of accountability—a responsibility to fulfill these goals and objectives.

The budget planning reports would consist of three main sections.

First, a progress section reviewing accomplishments for the past year and covering progress against plans established in the previous budget planning report — requiring specific comment on each goal and objective previously set. Major accomplishments not anticipated in previous planning reports would also be included.

The *second* section would be the planning section. This would include a statement of plans and objectives, and goals, in certain predetermined areas for the coming year. Briefly, these areas would cover:

Performance goals, and performance measures to be installed or improved.

Anticipated methods and procedures changes.

Training and development activities required in the forthcoming year to assist in accomplishing goals and objectives.

The *third* section—the budget support section—would be a narrative justification of the budgeted requirements for the forthcoming year.

Consideration would be given to the effect of levels of anticipated workload and current backlogs; on personnel requirements, and man-hour requirements—both regular and overtime—and their effect on expected labor dollars of expense. Also, consideration would be given to anticipated other-than-labor expenses such as discretionary expenses, maintenance, and other similar items.

These reports would be the basis for acceptance or rejection of the budget by top management.

The foregoing has presented a means of insuring enlightened planning and budgeting by the individuals responsible for managing the business. Each manager would be given the opportunity to tell what they have accomplished in the past year—what they hope to do—what they think they can do and what they plan to do in the coming year.

Having individuals put down their own plans by reporting compels performance. This leads us to the areas of: during-action review and after-action analysis, through performance analysis reports.

This is not an entirely new concept but a systematic way of interpreting monthly data, both operating and financial. In essence the system would supply analytical, interpretive information to supplement the usual operating and financial data. In actual practice

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*EEI members: A. R. St. Bernard, The Cleveland Electric Illuminating Co.; M. M. Ilch, Idaho Power Co.; A. O. Linville, Kansas City Power and Light Co. AGA members: James Poole, chairman, Texas Illinois Natural Gas Pipeline Co.; J. A. Ashe, The Connecticut Light and Power Co.; J. A. Depper, Natural Gas Pipeline Co. of America.

the reports would serve a dual purpose. In the longer-term annual picture, they would serve as a means for during-action review or control. In the shorter-term monthly picture, they would serve when appropriate as a means of analyzing and appraising completed action during the month or in the year to date.

The system would require the reporting back through the same channels outlined for the budget planning reports.

It is very possible for reporting systems to flood higher levels of management with so many reports that they tend to defeat their own purpose. Time just won't permit the proper digestion of the potential reams of information inherent in the system.

The volume of information could be controlled by the application of the exception principle or, in other words, reporting by exception, as follows:

> Reporting by exception consists of supplying each successive level of responsibility with an analysis and interpretation of performance which varies significantly from the normal level of operations. It involves more than a listing of variations, but rather includes the use of judgment in selecting items to be reported, in giving an adequate explanation and interpretation, and in recommending corrective measures.

Purpose of Report by Exception

Its purpose is to conserve time and effort by:

1. Calling attention only to those existing or potential problems which cannot be remedied at lower levels.
2. Providing brief analyses and interpretations of the significance of the problems reported so that corrective action may be developed and initiated.
3. Providing information which might have a material effect on operations in other elements of the company or on company policy.
4. Eliminating all unnecessary material.

Effective application of the exception principle consists of three principal parts: (1) development and use of performance comparisons, (2) careful selection of items to be reported, and (3) adequate analysis and interpretation.

1. *Performance Comparisons:* Reporting under the exception principle requires that management establish yardsticks to determine what constitutes a "normal level of operations." Among the yardsticks against which performance can be measured are standards, forecasts, and proper performance. Standards are the most reliable indicators if they have been objectively and scientifically developed. When performance is compared with the appropriate yardsticks it is possible to distinguish operations which are above or below the normal level.

Where yardsticks cannot be established it will be necessary to rely on management judgment in deciding whether performance has varied from normal levels.

2. *Careful Selection:* At every management level it is necessary to select carefully the items to be reported. Ordinarily, operations falling within normal ranges will not be included. Operations both above and below normal levels should be reported if experience and management judgment indicate that the problems or information would be of value to higher levels of responsibility.

3. *Analysis and Interpretation:* In discussing the problems selected, the causes and the effects on past or future operations should be stated briefly, and remedial action recommended wherever possible.

Checklist—"Do's" and "Don'ts"

The following are characteristics of items which should be reported under the exception principle:

1. Operations above or below the normal range.
2. Problems which cannot be remedied at the reporting level.
3. Significant problems being solved at the reporting level, but requiring an extended period of time to complete.
4. Progress on longer range projects designed to correct operating problems.
5. Problems or proposed changes in one department affecting operations in other departments.
6. Situations with a material effect upon overall company operations or policies.
7. Chronic sore spots.
8. Undesirable trends toward significant problems.
9. Data of particular or continuing interest to top management.

Under the exception principle, items with one or more of the following characteristics would not ordinarily be reported:

1. Operations falling within the normal range.
2. Routine problems being remedied promptly at the reporting level.
3. General information on operations.

* * * *

This paper does not pretend to include all of the answers to the budgeting problem. It is designed to point up the fact that it has become one of management's most important responsibilities. It is the corporate operating plan and as such requires the full cooperation of all management.

EEI Publications

Commercial Wiring Modernization

EEI Pub. No. 56-4. Prepared by the Wiring and Specifications Committee, Commercial Division, Edison Electric Institute. 32 pages. Price: single copy $1.00.

This publication is intended for use by store owners, building managers, architects, engineers, electrical contractors and utility people to help them evaluate the need for expanding wiring facilities in older buildings to provide an adequate electric supply for their tenants and customers. The material has been prepared in three sections: 1. **Why**—Section 1 presents typical examples of commercial buildings that were modernized to meet expanding electrical needs. 2. **How to Do It**—Section 2 shows some of the practical and low-cost methods utilized in commercial wiring modernization. 3. **Reference**—Section 3 lists six tables based upon the National Electrical Code which contains data pertinent to Section 2.

Tips on Room Air Conditioner and Attic Fan Installation

EEI Pub. No. 55-13-Revised edition. Prepared by the Wiring and Specifications Committee, Commercial Division, Edison Electric Institute. 16 pages. Price: 20 cents.

This booklet deals primarily with the need for proper sizing, location and wiring installation of room air conditioners and attic fans.

EEI-AGA Accounting Conference Planned

CUSTOMER and employee relations will be among the subjects emphasized at the 1957 National Conference of Electric and Gas Utility Accountants, sponsored by the EEI Accounting Division and AGA Accounting Section, April 8-10 in Washington, D. C.

Headquarters will be at the Sheraton-Park Hotel and sessions will be held there as well as in the Shoreham Hotel. Plans are nearing completion following a joint 1957 Conference Final Working Committee meeting in Detroit Feb. 7-8.

R. G. Schneider, Virginia Electric and Power Co., chairman of the EEI Accounting Division, and W. D. Sweetman, The Peoples Gas Light and Coke Co., chairman of the AGA Accounting Section, will preside over the Conference.

The pattern of holding a General Session on Monday, April 8, starting at 2 p.m. in the Sheraton Ballroom, with committee sessions on Tuesday, April 9 and Wednesday, April 10, will follow that of previous conferences. A dinner for the Conference is also planned for Tuesday evening.

General Session

Potomac Electric Power Co. and The Washington Gas Light Co., as host companies to the Conference, will be represented at the Monday session in a welcome to the group by the respective presidents, R. Roy Dunn and Everett J. Boothby. Because this will be the first conference held in Washington, the attendance is expected to be more than 1,200—a record high.

Following presentation of greetings by representatives of both associations, the general session will hear addresses by C. Hamilton Moses of House, Moses and Holmes on the subject of free enterprise; by Walter G. Barlow, vice president of Opinion Research Corp. on the fundamental problems of management leadership in today's opinion and attitude climate, and by John C. Childs, vice president of Irving Trust Co. on the cost of money and the importance of customer-employee-investor relations.

Representing four of the general activities standing committees, a general activities group session will highlight the Tuesday morning session. Included in this session will be a presentation by a speaker from one of the public accounting firms on the subject of how audit dollars can be saved and another by an outside speaker on the over-all functioning of the United States Treasury Department with regard to tax legislation and administration. Karl H. Rudolph, The Cleveland Electric Illuminating Co., will also participate in this session with a talk on "Planning and Control".

R. G. Schneider
Chairman, Accounting Division
Executive Committee

There will be presented in various committee sessions on Tuesday afternoon and Wednesday morning many timely and interesting subjects by projects groups of the committees comprising the general accounting group. Such subjects will include a discussion of the methods of depreciation accrual and reserve computation; court and commission decisions on depreciation; accelerated depreciation for tax purposes and the economic aspects of accelerated depreciation.

A review of new material appearing in annual reports for 1956 in connection with the analysis of financial statements, will be presented, and a combined effort of two groups to discuss the accounting aspects of accelerated depreciation and new accounting developments affecting utilities will highlight the program. The subject of methods and procedures will be explored thoroughly in a panel discussion with a moderator. Discussion on pinpointing responsibility for deviations from operating budgets, statements of source and disposition of funds and overhead costs will help fill out a well-balanced program.

A report on the current year study of the question of measuring and comparing internal auditing performance and papers on plant records required for declining balance and sum-of-the-years digits tax depreciation, together with presentations on group charging of minor materials to mass property accounts and purchase accounting application to property record problems are subjects to be discussed from a general accounting standpoint.

Customer Activities

A customer activities group session on Wednesday morning will highlight a panel discussion by two of the committees on the effect of credit and collections on customer relations. It is expected that many interesting matters will be revealed through this discussion. As part of its effort in the group session, the customer accounting committee will have one or two papers of mutual interest for presentation at this session.

A number of subjects will be presented to the Conference on customer activities during the several committee sessions on Tuesday. Among them are: the application of punched cards to meter order routines, a discussion of converting to automatic data processing, and a paper on what can be done to reduce meter reading expenses in rural areas. Also, consideration of the comparison of manual and mechanical methods for the preparation of final bills and merchandise billing procedures and a report describing comprehensive machine procedures used to determine new account balances, and practices followed to select accounts for collection treatment and definite recommendations for companies to follow charging expenses in connection with each detail operation, as part of a continuing project on standardizing for cost comparisons are all part of a thorough discussion of customer accounting matters.

From a customer relations standpoint, projects will develop material on such subjects as customer information services and electronic accounting, company policies and practices,

telephone contact standards and practices and customer service reports and records. Discussions will be held on area growth and meeting responsibilities to new customers and the problem of disseminating policies to the employee who is expected to put them into operation.

Sigurd Anderson, a member of the Federal Trade Commission, will speak at the Tuesday luncheon session of the Customer Collections Committees. Electronics in credit and collections, the best use of field representatives as collectors, a study of trends in public utility deposit policies and a report on the credit picture will be part of the collection committee program.

Special Activities

The Accounting Employee Relations Committees plan a work shop on employee relations matters at the Tuesday morning committee session and in the afternoon a panel session in an open discussion during which audience participation will take place on employee relations questions or problems. Projects dealing with supervisor problems and those in unionized accounting offices will also be developed.

The Electronic Accounting Machine Developments Committee plans a luncheon on Wednesday, continuing into an afternoon session in which current electronic data processing developments and problems will be probed.

Besides the Conference dinner and an entertainment program, a trip and luncheon for the ladies of the registrants attending the Conference is being developed.

A Catalog of

EEI Publications

is available upon

request to:

Edison Electric Institute

420 Lexington Ave.

New York 17, N. Y.

Zed E. Merrill

ZED E. Merrill, chairman of the board of directors, Pacific Power & Light Co., died recently at his home in Albany, Ore. following a long illness.

Mr. Merrill was 75 years of age.

A prominent figure in Northwest utilities industry, Mr. Merrill received his degree in electrical engineering from the University of Wisconsin and entered the utilities industry as a construction superintendent for the Milwaukee Electric Railway & Light Co. He went to the west in 1906 and worked for several utility companies before joining the former Mountain States Power Co. as assistant general manager in 1923. He was elected vice president of that company in 1932, to the board in 1936 and president in 1937.

He was named board chairman in 1950.

Mr. Merrill was a member of the Northwest Electric Light & Power Association, and served five terms on its executive committee. He subsequently was awarded an honorary life membership in that light and power organization.

William E. Wood

WILLIAM E. WOOD, former executive vice president of the Virginia Electric and Power Co., died recently in Richmond, Va. of a coronary thrombosis at the age of 69.

Mr. Wood, one-time streetcar operator, who rose to the presidency of two companies during his electric industry career, was graduated in electrical engineering in 1907 from Georgia Polytechnic Institute. He joined the engineering firm of Stone & Webster shortly thereafter and later operated a streetcar in Jacksonville, Fla.

In 1925, Mr. Wood became operating vice president of the Virginia Railway and Power Co., after it had been acquired by Engineers Public Service Co. The company's name in 1927 was changed to Virginia Electric and Power Co. and Mr. Wood was elected its president. He became vice president of Engineers Public Service in 1929 and remained in that position until 1941 when he accepted the presidency of Virginia Public Service Co., EPS subsidiary.

Virginia Public Service and Engineers Public Service merged in 1944 at which time Mr. Wood assumed the position he held with the combined utility at the time of his retirement in 1954, after 47 years with the electric industry.

He continued on Vepco's board of directors after his retirement. For the past two years he had been chairman of the Richmond - Petersburg Turnpike Authority which is constructing a toll road in Virginia.

During his career as a public utility executive, Mr. Wood served on many standing committees of the former National Electric Light Association and the present Edison Electric Institute. He was a former president of the American Transportation Association, the Southwestern Public Service Association and the Virginia Public Utilities Association.

Howard W. Memmott

HOWARD W. Memmott, industrial sales manager of Connecticut Light & Power Co., who was active in EEI committee work for many years, died recently of a heart attack is Glastonbury, Conn. He was 45.

Mr. Memmott was associated with Connecticut Light & Power from 1937 until his death. Until 1941 he was assistant power engineer; from 1941-47 he was power engineer; for the next four years he was division power engineer. He was appointed industrial sales manager in 1951.

A member of the EEI Industrial Power and Heating Section since 1951, Mr. Memmott at the time of his death was chairman of the EEI General Power and Heating Committee. He had served previously as a member of four Institute committees—General Power and Heating; Sales Methods and Development; Editing; Competitive Service. Mr. Memmott was graduated from Brown University with an engineering degree. He was a member and past chairman of the Power Engineers' Association of New England and a member of the Program Committee of the Industrial Electrification Council Heating School; member and former secretary of the Interstate Power Club of New York; president of the Exchange Club of Glastonbury. This club has established a Howard Memmott Memorial Fund to be used for educational purposes.

EEI Sales Conference to Be Held April 1-4

THE problems of promoting and selling electricity will be highlighted at the 23rd Annual Sales Conference of Edison Electric Institute, April 1-4, at Edgewater Beach Hotel, Chicago. More than 1,000 top-level sales executives of the electric industry are expected to establish a record high attendance at the conference which will have as its theme "Live Better Electrically with Full HOUSEPOWER."

The program, announced by T. O. McQuiston, chairman of the EEI Commercial Division Executive Committee and vice president, Metropolitan Edison Co., includes addresses by some of the electric industry's most outstanding personalities as well as those of allied fields.

On Monday, first day of the conference, the twenty-two EEI Commercial Division committees will meet. On Tuesday the four division groups—Commercial, Farm, Industrial and Residential—will have group meetings. At morning and afternoon sessions important figures in these fields will speak on subjects of importance to all in the electric industry.

The General Sessions — highlight of the meeting—have been scheduled for the last two days of the conference—Wednesday and Thursday, April 3-4.

Annual prize awards offered through the Institute will be presented at the General Awards Luncheon on Wednesday, April 3. A Farm Luncheon is planned for Tuesday and a General Luncheon on Thursday will feature a "Live Better . . . Electrically" program. The annual luncheon of the Public Utilities Advertising Association and the Home Service Breakfast both are scheduled for Tuesday.

General Sessions

Chairman McQuiston will preside at the general sessions and will deliver the opening remarks on Wednesday morning. He will report on the committee activities and accomplishments during the past year and will discuss briefly current projects. The outstanding sales and promotional problems facing the electric industry

T. O. McQUISTON
Chairman, Commercial Division
Executive Committee

at this time also will be reviewed by Mr. McQuiston.

Edwin Vennard, vice president and managing director of Edison Electric Institute, at the morning session will discuss "New Concepts in Selling the Electric Utility Industry." His presentation will deal primarily with the changes that have taken place in the selling methods in the industry and how each market today is being approached in connection with load building.

Ralph M. Besse, executive vice president, The Cleveland Electric Illuminating Co., will speak on "Recruiting and Training Personnel for Leadership in the Electric Utility Industry."

E. O. George, vice president, The Detroit Edison Co., and chairman of the EEI Wiring Promotion Committee, has as his subject "HOUSEPOWER." He will review accomplishments and plans for the HOUSEPOWER program. This one-year-old program has been given a top position on the 1957 General Sessions program because of its successful launching the first year's achievements.

On Wednesday afternoon Dr. E. J. Klock, manager, economics research and forecasting for General Electric Co., will discuss the over-all business outlook for the future and specifically that of the electric industry. Richard J. Babcock, president, *Farm Journal* Magazine Inc., will outline the "Electric Utilities Stake in the Farm Market." Arno H. Johnson, vice president, J. Walter Thompson Co., New York advertising firm, also will speak Wednesday afternoon.

Donald S. Kennedy, president, Edison Electric Institute and president and chairman of the board, Oklahoma Gas and Electric Co., will highlight the Thursday morning addresses with a discussion of the major problems facing the electric industry today.

A talk on "Lighting" will be presented by Don Willis, vice president of Arizona Public Service Co., and "Electric Heating" will be discussed by M. G. Kennedy of Ebasco Services Inc. Dr. Norman N. Royall, Jr., Kansas City scientist, plans to speak on "The Shadow of the Next Industrial Revolution."

Awards to be presented at the General Awards Luncheon Wednesday include: George A. Hughes Awards (electric ranges and water heaters; commercial electric cooking), Laura McCall Awards (home service), George Westinghouse Awards (electric laundry equipment), More Power to America Awards (industrial electrification), Martin Award (rural electrification), Lighting Education Awards (lighting education), Lighting Promotion Awards (lighting promotion), and Frank Watts Award (rural electrification).

Commercial Sales Group

R. I. Bull, chairman of the Commercial Sales Group and commercial sales supervisor, Ohio Power Co., will present the opening remarks at the Commercial Sales Group session, Tuesday morning, April 2. The theme for this session will be "Profitable Load Building," with a presentation by W. P. McPherson, chairman of the Commercial Lighting Committee and commercial sales manager for the Carolina Light and Power Co. "Developing Commercial Load to Increase Net Return" will be discussed by George W. Ousler, vice president-sales, Duquesne Light Co.

The subject to be explored by M. R. Rogers, senior marketing consultant, Middle West Service Co., is "Yardsticks for Commercial Sales." Tentatively scheduled for the morning session also is "Don't Overlook Your Trade Allies" by Oliver F. Burnett,

president, National Electrical Contractors Association.

The first speaker in the afternoon session will be G. W. McElhaney, chairman of the Commercial Electric Space Heating and Air Conditioning Committee, and general supervisor of air conditioning sales for the Ohio Edison Co. The theme of the afternoon meetings is "Load Building Through Modernization."

"Modernized Commercial Food Service—Modern Equipment Is a Must" will be discussed by W. C. Ayres, general manager, Hotpoint Commercial Equipment Department. D. W. Grosshandler, president, Electrical Information Publications, will address the Commercial Sales Group on "Modernization Is Selling Electric Cooking in 1957."

"A Modern Tool for Lighting Modernization" is the subject of the talk planned by H. A. Williams of Rohm & Haas Co. and "Space Conditioning the Modern Way—'Heat Pumps Have It'" will be the theme of an address by H. L. Cushing, system commercial manager, Appalachian Electric Power Co.

Fred Kreiser, general sales manager, Edwin L. Wiegand Co., will discuss "Resistance Heat Rings a Bell." "Space Conditioning Competition" is the title of a talk scheduled by E. R. Ambrose, AGE Service Corp., and a tentative address is planned by Arthur Harrington of General Electric Co. entitled "Modernized Street and Highway Lighting Aids Area Development."

Farm Group

M. O. Whithed, chairman of the Farm Group, and rural supervisor, Atlantic City Electric Co., will give the opening remarks at the Farm Group's Tuesday morning session. Burwell Smith, chairman of the Agricultural Development Committee and western division agricultural development agent for Carolina Power and Light Co., will preside during these sessions.

"Potentials in Future Electric Sales" will be explored by E. C. Easter, vice president, Alabama Power Co., and Paul Benbow, assistant sales manager, Jamesway Manufacturing Co., will tell "How to Plan and Carry Out a Local Sales Promotion Program."

At the Farm Luncheon, George B. Shuman, American Farm Bureau Federation, will discuss "Farming with a Future."

During the afternoon sessions Lamoyne Goodwin, chairman of the Rural Youth Committee and farm service director for Gulf States Utilities Co., will be in charge of the proceedings.

E. D. Smith, assistant sales promotion manager, Dayton Power and Light Co., will moderate a panel discussion on "Sales Programs That Work." Panel members and their subjects are: Bud Moss, manager, rural division, Georgia Power Co.—"Egg Cooling"; Roy Smith, farm sales director, Metropolitan Edison Co.—"Hay Drying"; Dwight Garber, supervisor, rural sales, Dayton Power and Light Co.—"Ventilation"; Homer Gibbs, manager, farm sales division, Texas Power and Light Co.—"Farm Lighting."

Industrial Power and Heating Group

Frank E. Wiatt, chairman of the Industrial Power and Heating Group and assistant manager of the electric sales department, The Cincinnati Gas and Electric Co., will deliver the opening remarks at the group's morning session on Tuesday. Paul W. McCormick, chairman of the Industrial Sales Methods and Development Committee and industrial sales manager, Union Electric Co., will preside.

"The Industrial Outlook," by George C. Smith, vice president, F. W. Dodge Corp., will be the first featured address. "Industrial Lighting—How It Can Ring the Cash Register" will be delivered by George J. Taylor, vice president in charge of eastern operations, Day-Brite Lighting Inc.

"How Hot Can You Get?" is the subject of the talk by Arnold D. Spillman, assistant manager, market studies and service division, Philadelphia Electric Co.

Mr. Wiatt will preside at afternoon sessions. "Taxes and Their Effect on Modernization" will be discussed by Albert C. Cohen, director of taxation for American Institute of Accounting.

"Creativity" is the theme of an address to be presented by Joseph A. Anderson, general manager, AC Spark Plug division, General Motors Corp. "A New Conception of Cooperation" will be presented by P. T. Lagrone, Electric utility sales department of the Westinghouse Electric Co.

Residential Group

Robert L. Coe, chairman of the Residential Group and residential sales manager for Union Electric Co., will preside at the Tuesday session of the Residential Group.

At the morning session, John Sabot, chairman of the Market Research Committee and market research supervisor, The Cleveland Electric Illuminating Co., will point out "Relationship of Customer Knowledge and Sales."

"Coordination Pays the Way" will be discussed by E. J. Hurley, chairman of the Residential Promotion Committee, and director of residential and rural sales for The Detroit Edison Co. "The Road Ahead" is the subject to be discussed by K. M. LaRue, chairman of the Residential Lighting Committee and general sales manager, Kansas Gas and Electric Co.

In the afternoon Miss Elizabeth Parker, chairman of the Home Services Committee and home service director of Georgia Power Co., will speak on "Those Dynamic Women of Home Service." This program also will include a motion picture of a tour of the Atlanta Electri-Living Home built under co-sponsorship of the *Living for Young Homemakers* magazine and Georgia Power Co.

"How to Make Friends and Influence Dealers" by Harry B. Price, former president of the National Appliance & Radio Dealers Association, is the final talk.

Youth's Opportunities

(*Continued from page* 47)

mobilizing the trained minds of the world under a philosophy that recognizes the fatherhood of God and the brotherhood of man. Einstein understood the need for an energy greater than mc^2 when he advised that the most pressing problems of the future would be in a category that might well be called spiritual.

As we face this future with faith and courage, let us share the ideals and the dreams of free men everywhere, also reaching back into time to the spirit of the men who shaped our great American tradition. There is much to do—and where there is both youth and truth it can be done.

The Utility House Organ

Employee Morale Builder

By Harvey Berman

EVERY month, in 40 states, some 27,000 employees of the American Telephone and Telegraph Co. receive a "letter from home," in the form of a profusely illustrated, smartly produced, and extremely interesting house magazine, known as *Long Lines*.

Over the years, the winner of a wide variety of awards for excellence presented by the publishing industry, *Long Lines* has come to be recognized as a leader in the utility company field. But of far greater importance is the fact that ever since its inception it has served as conclusive proof that the house organ—properly handled and boldly conceived—can link together and add cohesiveness to even as sprawling and as vast an organization as AT&T.

Need for Bond Seen

As an aide to *Long Lines*' editor Joseph Lindsay put it, only recently, "A long time ago, here at AT&T, we woke to the realization that it was essential that a common bond between the company's workers everywhere be established. The efficient operation of a firm and the progress that it makes, we came to see, depend to a large extent on employee morale, and hinge on imparting to workers the feeling that though thousands of miles may separate them, they are all one—all part of something big and important.

"Ever since, we have attempted to translate this belief into something more concrete; in our case, a company magazine dedicated to linking AT&T's far-flung elements together. Our aim has been—and continues to be—to maintain *Long Lines* as a warm, friendly, personal, and effective communications medium, bringing together worker and worker and employer and employee."

Long Lines, as its readers would readily agree, has succeeded admirably in achieving the goals it set itself. Moreover, along with a handful of other public utility house organs, it has helped set a pattern for newer company magazines to follow—magazines, incidentally, which have been springing up in increasing numbers, of late, all around the country.

For example, such firms as the New England Telephone & Telegraph Co.; the Boston Edison Co., the Southern California Gas Co.; the General Telephone Co. of Wisconsin; Gulf States Utilities; and the Commonwealth Edison Co. of Chicago—as well as dozens of other concerns, large and small—have now come to understand what AT&T learned a long time ago and are currently publishing distinguished periodicals of their own.

Most of them have accepted the fact that a good publication is not only of immense value to a firm as an employee morale builder, but, with variations, can also be used as a powerful public relations tool. Furthermore, the great majority of utilities today turning out publications have likewise made a decided attempt to turn away from the concepts that once ruled the house organ field. Instead of stuffing their columns with "boiler plate" and dull statistics regarding company operations, they are resorting more and more to personal items, popularized reports, and general interest material in no way connected with the firm.

To cite just one instance, the Illinois Bell Telephone Co.'s *News*, has been so laid out at present that the concern's 53,000 employees are being offered a monthly magazine that is not only informative but fascinating as well. The *News*' 48 pages include fiction, picture stories, personality sketches, and do-it-yourself items, in addition to the usual company notes.

News Broadened

The Telephone News, published by the Bell Telephone Co. of Pennsylvania, for its part, has become so lush that it compares favorably with even some of the finest mass-circulation magazines to be found on the newsstands of the nation. A typical issue, according to J. A. C. Foller—the publication's editor—includes a four-color cover, women's fashions, the latest beauty news, food hints, home furnishings and interior decorating do-it-yourselfs, travel features—and a "nice healthy chunk" of company information.

"We're interested in keeping our people happy, alert, and content with life here at Bell," Foller reports. "This is the purpose our magazine is attempting to serve."

In some instances, utilities have even allowed their house organs to go beyond the original scope set for them. Several years ago, the Arkansas Power & Light Co. decided that if its employee magazine could achieve such success as a morale builder, a similar periodical might likewise provide an excellent link between the company and the community. As a result, the firm began publishing a monthly magazine called, *The Electric Farm News*. Sent to over 90,000 customers in Arkansas Power & Light's territory, the *News* now presents a wide variety of features particularly interesting and useful to farmers, thus considerably enhancing the company's prestige in the community and adding to its standing as an organization devoted to public service.

Circulations Are 'Fantastic'

Still others, designed for a more general readership, have attained fantastic circulations and have earned the praise and the sincere thanks of those who receive them. One of the finest house magazines in the United States today is the Pacific Gas and Electric Co.'s *PG&E Progress*. Edited by Laurence McDonnell, a most competent company publication director, at the moment *Progress*' circulation stands at an incredible 1.2 million—a total that equals the readership of such mass-circulation periodicals as *Popular Science* and *Popular Mechanics*. Southern California Edison's *Electrical Times*, meanwhile, has long since passed the one million mark, while the Southern New England Telephone Co.'s *News* recently announced that it is now being read by over 650,000 customers.

More important than circulation, though, is the fact that these maga-

zines have at last established a direct medium of communication between company and community. Readers are invited to submit material, company policies are explained in such fashion that the public will find itself able to understand the problems utilities must face and the aims they are attempting to accomplish; and the customer is given "something for nothing."

Geary E. Griffith, Southern New England's editorial director, perhaps best summed up the goals that "outside" company magazines have erected for themselves when he declared, a while ago, "There are three things they are trying to do. First of all, they are trying to edge a little closer to the public by providing a good magazine at no additional charge. Secondly, they are attempting to win public favor by depicting, in popular terms, the principles and problems underlying utility operation. And last, by devoting space to such causes as the annual Red Cross drive, the Community Chest campaign, Easter seals, and so on, they are pushing toward a more active role in community affairs—seeking to become partners as well as servants of the people they are servicing."

Actually, though, despite the growing number of "outside" house organs, most company magazines are still being slanted to meet the needs and interests of employees. Chief among these is a need to fit, a need to belong some place in the company scheme of things. Utility companies, fully awake to the fact that to a large extent worker attitude, efficiency, and loyalty hinge on a feeling of "belonging," are trying to cultivate that feeling in every way possible. Nowhere more, however, is greater success being achieved than through the house organs they are currently publishing —truly one of a company's best tools for improved employee morale.—*Reprinted from* Public Utilities Fortnightly, *Jan. 31, 1957.*

Electrical System and Equipment Committee Meeting

By H. E. Deardorff, Chairman

THE Electrical System and Equipment Committee held its 71st meeting at the Somerset Hotel in Boston, Mass. on Feb. 11-12, with an attendance of approximately 120 members and guests.

The program of the meeting consisted of an inspection trip to the Brighton Substation of the Boston Edison Co. and the Salem Harbor Electric Generating Station of the New England Power Co. on Sunday afternoon: presentation of papers, reports, and discussions under the sponsorship of D. W. Taylor, chairman of the Subcommittee on System and Equipment Troubles; R. M. Pennypacker, chairman of the Subcommittee on Equipment and Station Operation and Maintenance; J. W. Bennett, chairman of the Subcommittee on Equipment and Station Design; and R. G. Hooke, chairman of the System Planning Subcommittee.

On Monday morning in closed session the program of the Subcommittee on System and Equipment Troubles was presented. Various system disturbances and apparatus failures were informally discussed by the committee.

On Monday afternoon the Subcommittee on Equipment and Station Design sponsored two papers on generator preheating. The first paper "Generator Field Prewarming Coordinated with Controlled Turbine Starting" was prepared by C. B. Scharp of the Baltimore Gas and Electric Co.

In an effort to chronologically coordinate the rotor warming procedures and the temperature controlled turbine starting procedures, a set of curves based upon the distribution of heat generated by the field coils were developed; these curves facilitate the carrying out of both sets of procedures simultaneously. The prewarming is divided into two parts, the first using the turning gear and the latter using steam roll by the turbine. By means of analytical calculations supported by field tests, the desirable current and time for each operation may be determined. It was suggested that electrical interlocks and alarms be provided to break the field circuit should the rotor stop turning during a turning gear prewarming operation to avoid burning the collector rings.

The second paper on prewarming of generators, entitled "Experience and Tests with Rotor Prewarming" was prepared by T. D. Reimers and R. L. Webb of the Consolidated Edison Co. of New York, Inc. This company has 25 machines on its system in the capacity range recommended for prewarming by certain manufacturers; they are attempting to do some prewarming or equivalent on these generators until more conclusive data is available. During normal operation, care is being exercised to maintain constant winding temperatures under various load conditions. By means of controlling the cooling water prior to shutdown and using the "bottling-up" method of storing heat, a short shutdown of 15 to 25 hours can terminate with a temperature of 60°C in the rotor body. The primary objection to the methods suggested by the manufacturers are the complications injected and the delay of three to five hours in synchronizing after the boiler and turbine are ready.

Several innovations are under investigation including passing hot water through the cooling coils, use of electric units or steam coils applied directly to the casing of the generator, and introducing heat into the hydrogen circuit. Concern was expressed with the possibility that prewarming of field rotors and the effect of "bottling-up" machines for short outages might cause accelerated girth-cracking or tape separation.

Late on Monday afternoon R. G. Hooke, chairman of the System Planning Subcommittee, presented a brief report on the activities and plans for his subcommittee. He said that two formal reports were in the final stages of preparation and that several other reports were under study. Subjects are studied by means of project groups, round table discussion, and prepared papers.

K. L. Wheeler of the Subcommittee

on Equipment and Station Design sponsored a paper on the "Electrical Features of Salem Harbor Station No. 3 Unit." This paper was prepared by O. E. Erickson of the New England Power Service Co. and M. T. Stantial of the Stone and Webster Engineering Corp. Located at the entrance of Salem Harbor, this plant has an ample supply of clear cold ocean water for condensing purposes, averaging 50°F annually with a low temperature of 34°F and a maximum summer temperature of 70°F. Ocean-going colliers and tankers may be unloaded at the adjacent Salem Terminal docks. Unit #3 Generator will be rated 160,000 kva at 30 lbs hydrogen pressure, 0.975 power factor lagging, 14,400 volts, 6415 amps per phase; it will be the largest generator on the New England Electric System. Connections from the new generator unit to main step-up transformer bank will be made by means of 27 underground cables, nine cables per phase, each approximately 400 feet long. The new generator will be grounded by means of a ground fault neutralizer. In this method of grounding generators, use is made of matching the capacitance to ground of the low voltage transformer winding, the main generator cable and the generator winding against the reactance of a reactor with taps to provide a nearly resonant tuned circuit with a minimum value of ground fault current.

Rating Circuit Breaker

The second paper on this portion of the program was presented by J. K. McDonald of the Pennsylvania Power and Light Co.

It described methods developed by this company for rating circuit breakers.

In accordance with established practice a round table discussion of subjects of general interest which had previously been submitted by members was held in Closed Session. H. E. Deardorff acted as moderator of the discussion.

The Tuesday afternoon session was devoted to a paper sponsored by G. M. Tatum of the Subcommittee on System Engineering and Operation entitled "Transfer Trip Relay and Other Remote Tripping Schemes." This paper was prepared by C. L. Headley of the Baltimore Gas and Electric Co. and presented by G. P. Fallon. Transferred trip relaying is one of the schemes used to initiate remote tripping; remote tripping is applied in most cases for the protection of transformers that are not provided with high-side breakers at the transformer. The methods utilize grounding switches, extended zone tripping by either pilot wire or by power line carrier, and transferred tripping by either pilot wire, power line carrier, or by microwave radio. In all of these schemes the tripping function is initiated by fault detecting relays at the local station. These relays may be those that detect faults in lines, in transformers, or in other station equipment and by means of the remote tripping scheme, cause breakers at distant stations to be opened to clear the fault from the system.

Advantages Outlined

Experience on the Baltimore Gas and Electric Co. System indicates that transferred trip relaying can be applied with good advantage. It can be used to protect equipment situated at remote locations without the addition of expensive circuit breakers, or it can be used to expedite clearing faulted lines by the addition of only minor relaying equipment. Reliability of transferred trip relaying to function correctly when required to clear faults can be obtained with but little difficulty; however, extreme care should be exercised in the design and maintenance of this relaying in order to assure against unwanted trip-outs.

The remainder of the meeting was devoted to presentation of reports by various members. L. J. Gill presented a progress report on the recent activities of the EEI-NEMA Joint Committee on Transformer Noise. J. H. Vivian informed the group that he felt realistic standardization of physical dimensions for high voltage bushings was nearing agreement by ASA C-76 Committee on Bushing Standardization. Oscar Bauhan reported on the recent activities of the AEIC-EEI-NEMA Joint Committee on Power Circuit Breakers. T. D. Reimers presented a detailed report on the recent activities of ASA Z-24, Acoustical Measurements and Terminology, paying particular attention to those aspects pertinent to measurement of transformer noise. C. E. Asbury described the recent activities of ASA C-50 on Rotating Electrical Machinery.

Report Shows Peak Load for U.S. in December Was 103,000,000 Kw

A YEAR-END report prepared by the Electric Power Survey Committee of the Edison Electric Institute shows a December, 1956 peak load of about 103 million kilowatts for the U. S. as a whole.

In October it was estimated the December peak load would be 106 million kilowatts.

The new report pointed out that unusually mild weather conditions in December were primarily responsible for the difference in the estimate and the actual peak load for the month.

Despite being lower than estimated, the peak of 103 million kilowatts represents an all-time high, exceeding the 1955, December peak load of 98 million kilowatts by about five per cent.

During 1956, actual power output in kilowatthours for the nation as a whole was close to estimates, setting a new record of about 600 billion. This was an increase of nearly 10 per cent over the 1955 production figure.

The report shows that new generating capacity placed in operation during 1956 totalled over 6.6 million kilowatts. As of Jan. 1, 1957, the capacity of all new generating equipment on order and scheduled for service was 44.8 million kilowatts—34 per cent more than at the beginning of 1956. The 15.6 million kilowatts now scheduled to go into operation during 1958 sets a new record. Of all the new capacity scheduled, 88 per cent is thermal and 12 per cent hydro. Included in the thermal portion is about a million kilowatts of atomic power, with the first atomic power plant scheduled for operation in 1957 and others scheduled in 1960 and later.

The foregoing figures include only generating units of 4,000 kw or greater. Smaller units were not represented in the report.

The report, which shows that during 1956 the nation's electric power systems ordered 17.9 million kilowatts of new generating capacity, includes the manufacturing schedules for major items of heavy power equipment.

Personals

R. F. Plymire, general commercial manager of Puget Sound Power & Light Co., has been promoted to vice president. **Ralph M. Davis** also was named secretary. Mr. Plymire will be responsible for the entire revenue side of the company's business, directing both sales and commercial activities. He has been with the company since his graduation from the University of Washington School of Engineering in 1930. Mr. Davis as head of the corporate department assumes the duties formerly handled by **Walter S. Zachary,** who retired Dec. 31. He most recently had been chairman of the Washington State Public Service Commission. Mr. Davis is a graduate of the University of Washington Law School and entered state government eight years ago.

H. V. Potts, director of employee relations for the Columbus and Southern Ohio Electric Co., was recently elected vice president in charge of employee relations, a new post. Mr. Potts has been with the company more than 30 years. Shortly after being graduated from Columbus Business College, Mr. Potts in 1925 joined the Columbus Railway, Power & Light Co., a predecessor of the present utility. He served in various supervisory capacities in the company's transportation system.

O. P. Reed, vice president and general manager of the Cheyenne Light, Fuel & Power Co., has been promoted to the position of manager of employee relations for Public Service Co. of Colorado. **Paul E. Brookover,** division commercial superintendent for Public Service, succeeds Mr. Reed. The employee relations vacancy was created by the death of **F. L. Whitsell.** Mr. Reed has more than 37 years of utility experience in practically all phases of the engineering and administrative aspects of the electric and gas utility business. He has served as president of the Cheyenne Engineers Club and is a member of the Wyoming Engineering Society, the American Institute of Electrical Engineers. Mr. Brookover was graduated from Kansas State College with a mechanical engineering degree in 1931 and immediately began his employment with Public Service Co. of Colorado. In more than 25 years with the company, he has held supervisory and administrative positions in the company's engineering and commercial operations.

Stewart L. Ferguson, treasurer of The Detroit Edison Co., retires March 1 after more than 43 years of service with the company. He will be succeeded by **Edward M. Spencer** whose election as treasurer was announced by the Edison board recently. A native Detroiter, Ferguson joined Detroit Edison as a construction department employee in 1910. In the same year, he enrolled as an engineering student at the University of Michigan and continued to work summers for Edison. After receiving his mechanical engineering degree in 1914, he went to work full-time in the company's meter department. In 1915, he transferred to the property department. He was appointed assistant secretary of the company in 1943, was given added responsibilities as assistant general accountant in 1950, and was elected treasurer in 1952. He is prominent in civic and community affairs. Mr. Ferguson is a member of the Economic Club of Detroit, the Detroit Chapter of Tax Executives Institute, the Engineering Society of Detroit and the Finance and Investor Relations Committee for Edison Electric Institute. The company announced that **Philip D. French,** treasurer's staff assistant, was appointed an assistant treasurer, effective also March 1. Mr. French joined the electric company in 1939 after he was graduated from Albion College. He has served in the sales, payroll and insurance departments. He has been secretary of Detroit Edison's Retirement Board since 1951.

Appointment of **Daniel E. Stewart** as manager of the area development department has been announced by Carolina Power & Light Co. He succeeds Vice President **S. Paul Vecker** who retired Feb. 28. Mr. Stewart has been associated with area development since 1943 when he became assistant to Mr. Becker. From 1943-47 he was concerned primarily with agricultural development activities. Since 1947 he has included industrial and community promotional activities in his duties. Mr. Stewart has been actively identified with much of the post-war location of new industries in the area served by CP&L. He received his degree in electrical engineering from N. C. State College in 1923 and that same year joined Westinghouse Electric Corp. In 1925 he came to CP&L as a student manager. From 1927-37 he was associated with industrial power sales and he then served as superintendent of the Western division, and assistant manager of that division until 1943. Mr. Vecker came to CP&L as general sales manager in 1935, after 24 years with electric and gas utilities in this country and Central America. He was graduated from Yale School of Engineering in 1911. His first job was with the American Gas Co. in Philadelphia. He subsequently worked with utilities in Florida, Panama and Cuba. In 1938 Mr. Vecker was promoted to vice president of CP&L with duties of agricultural and industrial development. In 1952 he relinquished his sales responsibilities and was appointed manager of the newly-created area development department. He is a former chairman of the EEI Dealer-Utility Committee.

Raymond A. Bryan, president and director of T. A. Loving and Co., general contracting firm, has been named to the board of directors, Carolina Power & Light Co. Mr. Bryan attended N. C. State College and now is vice president of the college's Engineering Foundation and is a trustee of Meredith College. He is a director and vice president of four North Carolina businesses and a director of two others. Mr. Bryan is vice chairman of the N. C. State Ports Authority. He succeeds **J. C. Richert, Jr.,** vice president in charge of district operations for CP&L, who has been serving on the board pending election of a new director on a permanent basis.

Austin Gavin, since October the assistant general counsel of Pennsylvania Power & Light Co., has been

appointed general attorney, succeeding **Jack K. Busby,** former company vice president and general counsel, who recently became executive vice president. The appointment as head of the PP&L Legal department is effective immediately. Attorney Gavin, a 1930 graduate of Ursinus College, and of the University of Pennsylvania Law School in 1933, is a native of Schwenksville, Pa., and has been with the utility for more than 20 years in Allentown. He formerly was junior counsel for the Pennsylvania Department of Revenue and served as law clerk for Pennsylvania Superior Court Justice H. Edgar Barnes. A World War II veteran, Attorney Gavin spent three years in the South Pacific and took part in the Guadalcanal, Bougainville and Luzon campaigns, earning the Silver Star Medal for gallantry and the Purple Heart for wounds.

Roy Torvinen, employed by Sierra Pacific Co. since 1930, has been appointed treasurer of the company, replacing **H. P. Dayton** who has retired. Mr. Torvinen started as chief clerk and 10 years later was promoted to assistant secretary and in 1942 advanced to assistant treasurer. He was named company secretary last February. Mr. Torvinen was associated with Puget Sound Power & Light Co. for nine years before he joined Sierra Pacific.

A. F. (Bert) Schultz, special representative for the Illinois Power Co. for the past seven years, has been appointed assistant to the president of the company. Mr. Schultz started his career with the utility in 1928 as a rural engineer. He was sales manager of the Decatur Service area in 1933; division engineer in 1936 and sales manager and new business supervisor in 1938. He was the Decatur service area manager until 1949 when he assumed the duties of special representative.

Charles H. McGeoch has been appointed assistant director of employee relations for the Niagara Mohawk Power Corp., in addition to his responsibilities as personnel manager of the Central division. He began his career with the company in 1929 at Syracuse in the customer accounting department, becoming supervisor of personnel planning and research in 1947 and division personnel manager in 1951.

Daniel A. Campbell, Jr. has been appointed general superintendent of Pennsylvania Power & Light Co., succeeding **Warren J. D. Geary** who has retired. Mr. Campbell has been superintendent of operation at Hazelton since last year. He joined PP&L 35 years ago, shortly after his graduation from Pennsylvania State University as an electrical engineer. After a number of promotions he was appointed assistant superintendent of the Lehigh Division operating department at Allentown in 1939. Mr. Geary served 45 years with the company and its predecessors.

Norman C. Storck has assumed the duties of chief electrical engineer for Wisconsin Electric Power Co. In his new capacity, Mr. Storck becomes head of the company's electrical distribution department. He succeeded **William E. Gundlach** who retired Jan. 1 after more than 46 years of service. Mr. Storck joined Wisconsin Electric in 1937 as a junior engineer soon after he was graduated from the University of Wisconsin. In 1956, he was named assistant chief electrical engineer. He also is chairman of the Milwaukee section of the American Institute of Electrical Engineering.

Southwestern Gas and Electric Co. has appointed **John W. Turk** to the new position of nuclear development engineer. Mr. Turk, a graduate of the University of Texas, will work full time in studying and evaluating developments in the field of atomic power. He has served as chief engineer at the company's Lone Star power plant since 1954.

J. H. McGuire, assistant to the president of Georgia Power Co., has been transferred to The Southern Co. as assistant to **Harllee Branch, Jr.,** new president of The Southern Co. Mr. McGuire received a degree in commerce from the University of Georgia's Atlanta division in 1938. Before becoming assistant to the Georgia president in 1954, he was a residential and research engineer in the company's sales department.

John E. Gray has been appointed general superintendent of construction and **Edwin M. Gue** was named system planning engineer for the Duquesne Light Co. Mr. Gray formerly was project manager for the Shippingport Atomic Power plant, a position he had held since joining the company in 1954. He will continue to coordinate Duquesne activities on this project. Previously he was a research engineer for Westinghouse, assigned to the Manhattan A-Bomb Project, and with General Electric at the Knolls Atomic Laboratory in Schenectady and Hanford Atomic Products Plant. Later, while with the Naval Reactors Branch of the U. S. Atomic Energy Commission, he helped develop the *Nautilus*, the first atomic-powered submarine. Mr. Gue, with the company since 1937, first was a design engineer. He served as senior design engineer, electrical station engineer, and electrical design engineer. For the past two years he has been associated with the electrical design of the Shippingport plant. Mr. Gue received degrees in electrical engineering from the University of Maryland.

Ernest H. Nelson and **Robert K. Vibert** have been appointed managers of the Middletown and Farmington divisions of the Connecticut Power Co. Mr. Nelson attended the Edison Institute and Yale Extension School. He joined the company at Stamford in 1926 and was named assistant manager at Middletown in 1946. In 1951 he became manager of the Farmington division. Mr. Vibert's appointment in Farmington is his first managership. He attended the University of the South and entered the meter department of the company in 1940.

Election of two new officers and three major appointments have been announced by Delaware Power & Light Co. **R. B. Richardson** was elected vice president in charge of operations and **Fred T. Bear** vice president in charge of engineering. Both report to **Frank P. Hyer,** vice president responsible for operations, engineering and construction. At the same time **Harold W. Clift** became operating manager; **Charles W. Minich** was promoted to manager of gas operations, succeeding Mr. Clift, and **Carl R. Roehm** was appointed super-

intendent of gas distribution department, replacing Mr. Minich. Mr. Richardson received his education at Marietta (Ohio) College and began his utility career as plant foreman for the Mobile Gas Co. Mr. Bear was graduated from Pennsylvania State College with an electrical engineering degree and entered the utility business in 1922 with the Philadelphia Suburban Gas & Electric Co. He joined the Delaware Power & Light Co. in 1929. Mr. Clift was graduated from the University of Delaware with an electrical engineering degree.

Mr. Minich also received his degree in electrical engineering from the University of Delaware. He was employed by Deleware Power & Light Co. in 1934 as clerk in the gas distribution department. Mr. Roehm was graduated from the Drexel Institute of Technology and joined the company in 1930 as a clerk in the company's garage.

Paul A. Gray has been named commercial services director of the San Diego Gas & Electric Co. A veteran of 32 years service with the company, Mr. Gray in 1944 became order department supervisor, which was his position at the time of his new appointment. In his new position he will have jurisdiction over the order, investigation and appliance repair departments and will exercise functional direction of the activities of those three departments in the various districts.

Elmer E. Fancher was appointed general superintendent for the northern district, Western division, Niagara Mohawk Power Corp., and **John H. DeWitt** becomes superintendent of transportation for the Eastern division of the company. Mr. Fancher succeeds **Oliver A. Church** who retired recently. He is a graduate of the University of Cincinnati with a degree in mechanical engineering. He joined Niagara Mohawk in 1925. In 1950 he was appointed general superintendent of safety and training and in 1953 was named assistant general operating superintendent for the northern district. Mr. DeWitt joined the company in 1930 as a mechanic in the Albany garage. Since then he has held supervisory positions in the division transportation department at Albany and Troy.

Rural Home Electric Load Building Contest Winners

ALABAMA POWER CO., Birmingham, Ala., and Dayton Power and Light Co., Dayton, O., were presented with first and second awards, respectively, in the National Rural Home Electric Load Building Contest as a feature of the 13th annual National Adequate Wiring Conference.

The contest is sponsored by the Competitive Fuels Committee of the National Electrical Manufacturers Association. It was conceived as a means of rewarding power suppliers for their efforts in furthering the sale of major electric appliances in competition with bottled gas appliances. The presentation was made by R. W. Lewis, member of NEMA Farm and Rural Market Development Committee.

Honorable mention in the Utility Division went to New York State Electric and Gas Corp., Wisconsin Public Service Corp., Central Illinois Public Service Co., and Sacramento Municipal Utility District.

The first award winner received a cash prize of $250, and the second award winner, a cash prize of $150. In addition both received bronze plaques. Merit awards were presented to all companies receiving honorable mention in the contest.

Highlights of the two winning entries show that, although both utility companies merchandise, they also work closely with electrical distributors and dealers in selling major electrical appliances to their farm and rural customers.

Alabama Power Co.

Alabama Power Co. reported that one out of four major electric appliances sold in its farm and rural territory last year replaced a presently installed bottled gas appliance. In fact, 24.2 per cent of all such electric appliance sales were made as a result of replacing electric for bottled gas appliances.

The company exceeded its farm and rural appliance sales quota last year by 170.8 per cent. Total sales of major electric appliances in the company's territory last year amounted to $635,550.01, as compared with the year's dollar quota figure of $372,071.

A big feature of Alabama Power's 1956 program was the promotion of 280 all-electric homes.

Dayton Power and Light Co.

Dayton Power and Light Co. reported that it replaced 1,055 bottled gas appliances with electric appliances for a percentage of 11.2 of total sales. As a result of its program, the company added 2,065,680 kwhs to its line for increased revenue estimated at $37,601.40. One of this utility company's major promotional "assists" in its rural load building program was a policy permitting installation allowances for electric ranges and water heaters. A total of $31,310.76 was invested in this phase of the company's program last year.

Electricity's Place

(*Continued from page* 40)

cepts in electric generation and transmission, and the improvement and expansion of dependable service to our customers have all accrued to the benefit of the investors in our industry—who have sensed that its greatest strength and greatest promise lie in the ever-increasing integration of electric service with the whole life and economy of the nation.

Certainly their response to our requirements for new funds has demonstrated an exceptionally high degree of confidence in our industry. And this, with your continuing help, has encouraged us in our planning for, and our optimism about, the future.

Street Tree Conference

(*Continued from page* 48)

REGISTRATION FEE, $12.50, includes banquet and copy of Conference Proceedings, in which all papers and discussions will be printed. Send registrations, with registration fee, to E. H. Scanlon, 7621 Lewis Road, Olmsted Falls, Ohio.

Please make hotel reservation directly with Hotel Cleveland, mentioning attendance at the Street Tree and Utility Conference.

Extra copies of Conference Proceedings will be available. Estimated cost: $3.00.

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Depreciation Accounting, P. K. READ.....New York State Electric & Gas Corp., Ithaca, N. Y.
General Accounting, A. T. EMMONS.....West Penn Power Co., Greensburg, Pa.
Internal Auditing, R. E. TATE.....Kansas Gas and Electric Co., Wichita, Kans.
Plant Accounting and Property Records, A. C. HERRON.....Florida Power Corp., St. Petersburg, Fla.
Taxation Accounting, R. J. VAN ESS.....Consumers Power Co., Jackson, Mich.
Coordinator of Special Activities Group, J. D. ELLIOTT.....The Detroit Edison Co., Detroit, Mich.
Accounting Developments Service, A. H. KERN.....Alabama Power Co., Birmingham, Ala.
Accounting Employee Relations, J. F. MCCAHON.....Philadelphia Electric Co., Philadelphia, Pa.
Application of Accounting Principles, R. R. FORTUNE.....Pennsylvania Power & Light Co., Allentown, Pa.
Electronic Accounting Machine Development, RUSSELL BRITT.....Wisconsin Electric Power Co., Milwaukee, Wis.
Uniform System of Accounts, P. R. LAWSON.....Pennsylvania Electric Co., Johnstown, Pa.

COMMERCIAL

Commercial Division Executive, T. O. MCQUISTON.....Metropolitan Edison Co., Reading, Pa.
Commercial Sales Group, R. I. BULL.....Ohio Power Co., Canton, Ohio
Farm Group, M. O. WHITHED.....Atlantic City Electric Co., Atlantic City, N. J.
Industrial Power & Heating Group, F. E. WIATT.....The Cincinnati Gas & Electric Co., Cincinnati, Ohio
Residential Group, ROBERT L. COE.....Union Electric Co., St. Louis, Mo.
Special Services Group, B. L. PALM.....Central Illinois Public Service Co., Springfield, Ill.

ENGINEERING

Engineering & Operating Division Executive, C. W. FRANKLIN...Consolidated Edison Co. of N. Y., Inc., New York, N. Y.
Electrical System & Equipment, H. E. DEARDORFF.....The Dayton Power and Light Co., Dayton, Ohio
Hydraulic Power, L. B. CARD.....Public Service Co. of Colorado, Denver, Colo.
Meter & Service, G. J. YANDA.....The Cleveland Electric Illuminating Co., Cleveland, Ohio
Prime Movers, J. M. DRISCOLL.....Consolidated Edison Co. of N. Y., Inc., New York, N. Y.
Transmission & Distribution, G. H. FIEDLER.....Rochester Gas and Electric Corp., Rochester, N. Y.

GENERAL

General Division Executive, J. W. MCAFEE.....Union Electric Co., St. Louis, Mo.
Accident Prevention, R. W. WHITE.....Pacific Gas and Electric Co., San Francisco, Calif.
Area Development, J. R. FREDERICK.....Wisconsin Power & Light Co., Madison, Wis.
Atomic Power, E. H. DIXON.....Middle South Utilities Inc., New York, N. Y.
Awards, G. W. OUSLER.....Duquesne Light Co., Pittsburgh, Pa.
Electric Power Survey, A. S. GRISWOLD.....The Detroit Edison Co., Detroit, Mich.
Financing & Investor Relations, W. J. ROSE.....American Gas and Electric Co., New York, N. Y.
Industrial Relations, J. C. ARNELL.....Consolidated Edison Co. of N. Y., Inc., New York, N. Y.
Insurance, R. D. CONSTABLE.....Niagara Mohawk Power Corp., Syracuse, N. Y.
Legal, J. M. KEEGAN.....Consolidated Edison Co. of N. Y., Inc., New York, N. Y.
Membership, E. S. THOMPSON.....The West Penn Electric Co. (Inc.), New York, N. Y.
Purchasing & Stores, E. N. SCOTT.....Long Island Lighting Co., Hicksville, N. Y.
Rate Research, L. W. FRANK.....Western Massachusetts Electric Co., Springfield, Mass.
Regulation, J. E. CORETTE.....The Montana Power Co., Butte, Mont.
Research Projects, E. H. SNYDER.....Public Service Electric and Gas Co., Newark, N. J.
Statistical, F. A. KEANE.....Public Service Electric and Gas Co., Newark, N. J.
Tax Policy, C. B. MCMANUS.....The Southern Co., Inc., Atlanta, Ga.
Technical Assistance for Overseas Visitors, HARVEY BUMGARDNER.....The Detroit Edison Co., Detroit, Mich.
Transportation, R. E. HAMEL.....The Cleveland Electric Illuminating Co., Cleveland, Ohio